

PowerFlex 700S and 700H Frames 10...14 IP00, NEMA/UL Open Power Structures

This document provides instructions for the installation of PowerFlex® 700S and 700H frames 10...14, IP00, NEMA/UL Type Open power structures in a customer supplied enclosure(s).

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Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing an Allen-Bradley® industrial automation system that may include programmable controllers, industrial computers, operator-interface terminals, display devices, and communication networks.
Preventive Maintenance of Industrial Control and Drive System Equipment, publication DRIVES-TD001A	Provides a checklist as a guide in performing preventive maintenance on industrial control and drive system equipment.
Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control, publication SGI-1.1	Provides general guidelines for the application, installation, and maintenance of solid state control in the form of individual devices or packaged assemblies incorporating solid state components.
Guarding Against Electrostatic Damage, publication 8000-4.5.2	This document explains the causes of ESD, and how you can guard against its effects.
Wiring and Grounding Guidelines for Pulse Width Modulated AC Drives, publication DRIVES-IN001	Provides basic information needed to properly wire and ground Pulse Width Modulated (PWM) AC drives.
PowerFlex 700S and 700H, Frames 9...14, AC Drives Installation Instructions, publication PFLEX-IN006	Provides instructions for the mechanical installation and for connecting incoming power, the motor, and basic I/O to enclosed Frame 9...14 PowerFlex 700S and 700S adjustable frequency AC drives.
PowerFlex 700H AC Drives Programming Manual, publication 20C-PM001	Provides information needed to start-up, program, and troubleshoot the PowerFlex 700H AC drive.
PowerFlex 700S AC Drives Programming Manual, publication 20D-PM001	Provides information needed to start-up, program and troubleshoot the PowerFlex 700S Phase II AC drive.
PowerFlex 700S Drives with Phase II Control Reference Manual, publication PFLEX-RM003	Provides detailed PowerFlex 700S drives with Phase II control functions and application programming examples.
Product Certifications website, http://www.ab.com	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at <http://www.rockwellautomation.com/literature/>. To order paper copies of technical documentation, contact your local Allen-Bradley distributor or Rockwell Automation sales representative.

Introduction

A power structure can contain a Non-Regenerative Front-End (NFE) converter module(s) and inverter modules or only NFE converter modules or inverter modules. The power structures can be installed in any enclosure that meets the requirements specified in this manual. Throughout this manual, the Rittal TS8 is used as an example enclosure. Some items shown in a Rittal enclosure are non-standard components and will require fabrication. Frames 10...14 can use the components listed in [Table 1](#) and [Table 2](#) on page [3](#):

Table 1 - 400/480V AC Input and 540/650V DC Input Drive Components

Drive Catalog Number ⁽¹⁾	Output Amps ⁽²⁾	480V AC Input (20xD) ⁽³⁾ 650 DC Input (20xJ)		400V AC Input (20xC) ⁽³⁾ 540V DC Input (20xH)		Frame	Quantity				Choke		Control Frame Width ⁽⁵⁾ mm (in.)
		ND HP	HD HP	ND kW	HD kW		Power Structure	NFE Converter ⁽⁴⁾	Inverter	Choke ⁽⁴⁾	Catalog Number	Taps	
20xy385N	385 (300)	300	250	200	160	10	1	1	2	1	CHK0520	1-2	600 (23.6)
20xy460N	460 (385)	350	300	250	200	10	1	1	2	1	CHK0520	1-2	600 (23.6)
20xy500N	500 (420)	450	350	250	250	10	1	1	2	1	CHK0520	1-2	600 (23.6)
20xy590N	590 (520)	500	450	315	250	11	1	2	3	2	CHK0400	1-2	800 (31.5)
20xy650N	650 (590)	500	500	355	315	11	1	2	3	2	CHK0400	1-2	800 (31.5)
20xy730N	730 (650)	600	500	400	355	11	1	2	3	2	CHK0400	1-2	800 (31.5)
20xy820N	820 (730)	700	600	450	400	12	2	2	4	2	CHK0520	1-2	600 (23.6)
20xy920N	920 (820)	800	700	500	450	12	2	2	4	2	CHK0520	1-2	600 (23.6)
20xy1K0N	1030 (920)	900	800	560	500	12	2	2	4	2	CHK0520	1-2	600 (23.6)
20xy1K1N	1150 (1030)	1000	900	630	560	13	2	2	3	2	CHK0650	1-2	600 (23.6)
20xy1K3N	1300 (1150)	1200	1000	710	630	13	2	3	3	3	CHK0520	1-2	800 (31.5)
20xy1K4N	1450 (1200)	1250	1000	800	710	13	2	3	3	3	CHK0520	1-2	800 (31.5)
20xy1K7N	1770 (1600)	1500	1400	1000	900	14	4	4	6	4	CHK0520	1-2	600 (23.6)
20xy2K1N	2150 (1940)	1900	1700	1200	1100	14	4	4	6	4	CHK0650	1-2	600 (23.6)
20xy2K7N	2700 (2300)	2300	2000	1600	1300	14	4	6	6	6	CHK0650	1-2	800 (31.5)

(1) Refer to rating columns for catalog number explanation.

(2) These drives have dual current ratings; one for normal duty applications, and one for heavy duty (in parenthesis). The drive may be operated at either rating.

(3) x = "D" for PowerFlex 700S and "C" for PowerFlex 700H.

(4) AC input drives only.

(5) Control frame width accommodates Rittal TS8 enclosure width.

Table 2 - 600/690V AC Input and 810/932V DC Input Drive Components

Drive Catalog Number ⁽¹⁾	Output Amps ⁽²⁾	600V AC Input (20xE) ⁽³⁾ 810V DC Input (20xK)		690V AC Input (20xF) ⁽³⁾ 932V DC Input (20xM)		Frame	Quantity				Choke		Control Frame Width ⁽⁵⁾ mm (in.)
		ND HP	HD HP	ND kW	HD kW		Power Structure	NFE Converter ⁽⁴⁾	Inverter	Choke ⁽⁴⁾	Catalog Number	Taps	
20xy261N	261 (208)	250	200	250	200	10	1	1	2	1	CHK0261	1-3	600 (23.6)
20xy325N	325 (261)	350	250	315	250	10	1	1	2	1	CHK0400	1-3	600 (23.6)
20xy385N	385 (325)	400	350	355	315	10	1	1	2	1	CHK0400	1-3	600 (23.6)
20xy416N	416 (325)	450	350	400	315	10	1	1	2	1	CHK0400	1-3	600 (23.6)
20xy460N	460 (385)	450	400	450	355	11	1	1	3	1	CHK0520	1-3	800 (31.5)
20xy502N	502 (460)	500	450	500	450	11	1	1	3	1	CHK0520	1-3	800 (31.5)
20xy590N	590 (502)	600	500	560	500	11	1	2	3	2	CHK0400	1-3	800 (31.5)
20xy650N	650 (590)	700	650	630	560	12	2	2	4	2	CHK0400	1-3	600 (23.6)
20xy750N	750 (650)	800	700	710	630	12	2	2	4	2	CHK0400	1-3	600 (23.6)
20xy820N	820 (750)	900	700	800	630	12	2	2	4	2	CHK0400	1-3	600 (23.6)
20xy920N	920 (820)	1000	900	900	800	13	2	2	3	2	CHK0520	1-3	600 (23.6)
20xy1K0N	1030 (920)	1100	1000	1000	900	13	2	2	3	2	CHK0520	1-3	600 (23.6)
20xy1K1N	1180 (1030)	1300	1100	1100	1000	13	2	2	3	2	CHK0650	1-3	600 (23.6)
20xy1K5N	1500 (1300)	1600	1400	1500	1300	14	3	3	6	3	CHK0520	1-3	800 (31.5)
20xy1K9N	1900 (1500)	2000	1600	1800	1500	14	4	4	6	4	CHK0520	1-3	600 (23.6)
20xy2K2N	2250 (1900)	2400	2000	2000	1800	14	4	4	6	4	CHK0650	1-3	600 (23.6)

(1) Refer to rating columns for catalog number explanation.

(2) These drives have dual current ratings; one for normal duty applications, and one for heavy duty (in parenthesis). The drive may be operated at either rating.

(3) x = "D" for PowerFlex 700S and "C" for PowerFlex 700H.

(4) AC input drives only.

(5) Control frame width accommodates Rittal TS8 enclosure width.

General Precautions



ATTENTION: To avoid an electric shock hazard, ensure that all power has been removed before proceeding. In addition, before servicing, verify that the voltage on the bus capacitors has discharged. Check the DC bus voltage at the Power Terminal Block by measuring between the +DC and -DC terminals, between the +DC terminal and the chassis, and between the -DC terminal and the chassis. The voltage must be zero for all three measurements.



ATTENTION: The following information is merely a guide for proper installation. Rockwell Automation, Inc. cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored.



ATTENTION: An incorrectly applied or installed drive/power structure can result in component damage or a reduction in product life. Wiring or application errors, such as, undersizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures may result in malfunction of the system.



ATTENTION: Only qualified personnel familiar with adjustable frequency AC drives and associated machinery should plan or implement the installation, start-up and subsequent maintenance of the system. Failure to comply may result in personal injury and/or equipment damage.



ATTENTION: HOT surfaces can cause severe burns. **Do not** touch the heatsink surface during operation of the drive. After disconnecting power allow time for cooling.



ATTENTION: Hazard of permanent eye damage exists when using optical transmission equipment. This product emits intense light and invisible radiation. Do not look into fiber-optic ports or fiber-optic cable connectors.



ATTENTION: This drive contains **ESD** (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing or repairing this assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with static control procedures, reference A-B publication 8000-4.5.2, "Guarding Against Electrostatic Damage" or any other applicable ESD protection handbook.



ATTENTION: The sheet metal cover and mounting screws on the ASIC Board located on the power structure are energized at (-) DC bus potential high voltage. Risk of electrical shock, injury, or death exists if someone comes in contact with the assembly.

Required Steps

Installing the power structure(s) in an enclosure involves the following major steps:

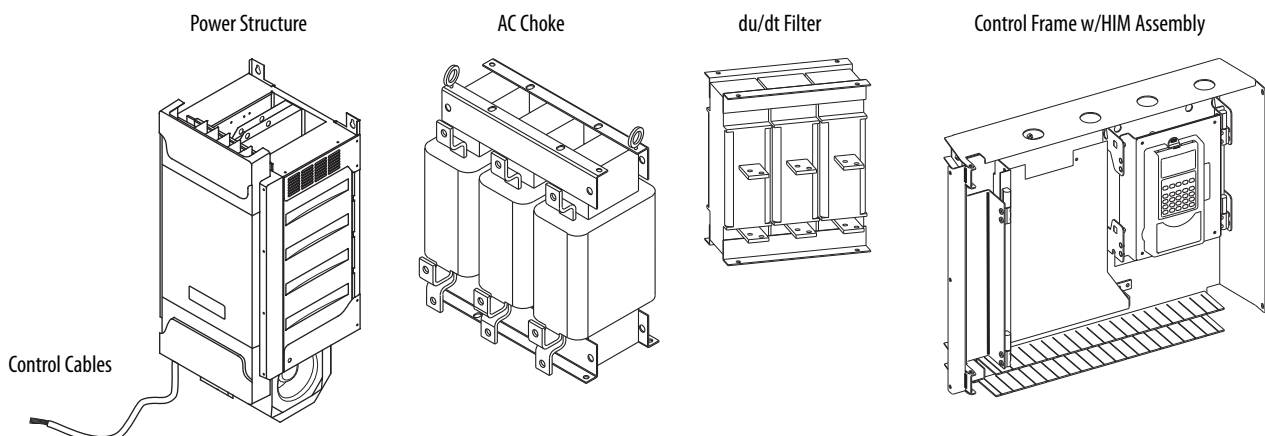
1. Select and prepare the enclosure(s)
2. Install the AC choke(s) - AC input drives only
3. Install and ground the power structure(s)
4. Connect the internal power cables
5. Install the control frame
6. Connect the control wiring
7. Install the du/dt filter(s) - frame 14 drives only (if ordered)
8. Install any options

Product Handling

Standard Components (see illustrations below)

- Power Structure(s) - NFE converters and inverters (see [Table 1](#) and [Table 2](#) on [page 3](#) for the number of power structures provided with each frame size)
- AC choke(s) - AC input drives only
- du/dt filter(s) - for frame 14 only (if ordered)
- Control frame with HIM assembly
- Control Cable Set - includes fiber optic cables and 24V connecting cable (connects power structure and the control frame).
Standard length of 2.3 m (7.5 ft)
- Frames 12 and 14 include a fiber optic cable set for internal control connections between power structures

IMPORTANT All power cables, busbars, enclosures, enclosure options and mounting hardware are customer supplied.



Power Structure Weights and Lifting Instructions

Use the weights listed in the tables below and the Lifting Instructions on page [8](#) when lifting the power structures.



ATTENTION: To guard against possible personal injury and/or equipment damage...

- Remove any wiring access covers at the top of the drive.
- Do Not allow any part of the drive or lifting mechanism to make contact with electrically charged conductors or components.
- At no time should a person or their limbs be directly underneath the items being lifted.
- Do not subject the load to high rates of acceleration or deceleration.
- Inspect all lifting hardware for proper attachment before lifting drive unit.

Table 3 - Frames 10...12 Approximate Weights

Frame Size	Drive Voltage Class	Drive Rated Amps	Power Structure Weight	AC Choke Weight	AC Input Drive and Packaging Weight ⁽⁴⁾
			kg (lb)	kg (lb)	kg (lb)
10	400	385	120 (265)	115 (254)	235 (519)
		460	120 (265)	115 (254)	235 (519)
		500	120 (265)	115 (254)	235 (519)
	600	261	120 (265)	53 (117)	173 (382)
		325	120 (265)	84 (185)	204 (450)
		385	120 (265)	84 (185)	204 (450)
		416	120 (265)	84 (185)	204 (450)
11	400	590	210 (463)	84 (185) ⁽²⁾	378 (833)
		650	210 (463)	84 (185) ⁽²⁾	378 (833)
		730	210 (463)	84 (185) ⁽²⁾	378 (833)
	600	460	210 (463)	115 (254)	325 (717)
		502	210 (463)	115 (254)	325 (717)
		590	210 (463)	115 (254) ⁽²⁾	440 (970)
12	400	820	120 (265) ⁽¹⁾	115 (254) ⁽³⁾	350 (772)
		920	120 (265) ⁽¹⁾	115 (254) ⁽³⁾	350 (772)
		1030	120 (265) ⁽¹⁾	115 (254) ⁽³⁾	350 (772)
	600	650	120 (265) ⁽¹⁾	84 (185) ⁽³⁾	288 (635)
		750	120 (265) ⁽¹⁾	84 (185) ⁽³⁾	288 (635)
		820	120 (265) ⁽¹⁾	84 (185) ⁽³⁾	288 (635)

(1) Two power structures are required per frame 12 drive.

(2) Two AC chokes are required for this frame 11 AC drive.

(3) Two AC chokes are required per frame 12 AC drive.

(4) DC input drive and packaging weight is equal to the weight of the power structure(s).

Table 4 - Frame 13 Approximate Weights

Drive Voltage Class	Drive Rated Amps	Inverter Unit	AC Choke	NFE Converter Unit
		kg (lb)	kg (lb)	kg (lb)
400	1150	306 (675)	130 (287) ⁽¹⁾	67 (148) ⁽¹⁾
	1300	306 (675)	115 (254) ⁽²⁾	67 (148) ⁽²⁾
	1450	306 (675)	115 (254) ⁽²⁾	67 (148) ⁽²⁾
600	920	306 (675)	130 (287) ⁽¹⁾	67 (148) ⁽¹⁾
	1030	306 (675)	130 (287) ⁽¹⁾	67 (148) ⁽¹⁾
	1180	306 (675)	130 (287) ⁽¹⁾	67 (148) ⁽¹⁾

(1) Two AC chokes and NFE (Non-Regenerative Front-End) modules are required for this frame 13 AC drive.

(2) Three AC chokes and NFE modules are required for this frame 13 AC drive.

Table 5 - Frame 14 Approximate Weights

Drive Voltage Class	Drive Rated Amps	Inverter Unit	AC Choke	NFE Converter Unit	du/dt Filter ⁽⁴⁾
		kg (lb)	kg (lb)	kg (lb)	kg (lb)
400	1770	306 (675)	115 (254) ⁽¹⁾	67 (148) ⁽¹⁾	160 (353)
	2150	306 (675)	130 (287) ⁽¹⁾	67 (148) ⁽¹⁾	160 (353)
	2700	306 (675)	115 (254) ⁽²⁾	67 (148) ⁽²⁾	160 (353)
600	1500	306 (675)	115 (254) ⁽³⁾	67 (148) ⁽³⁾	120 (265)
	1900	306 (675)	115 (254) ⁽¹⁾	67 (148) ⁽¹⁾	160 (353)
	2250	306 (675)	130 (287) ⁽¹⁾	67 (148) ⁽¹⁾	160 (353)

(1) Four AC chokes and NFE modules are required for this frame 14 AC drive.

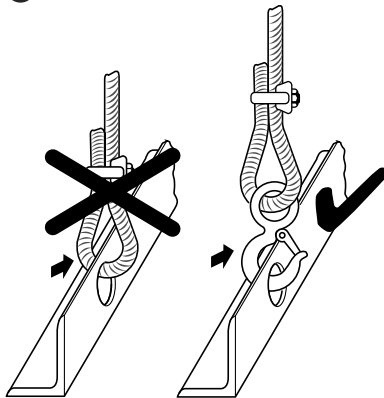
(2) Six AC chokes and NFE modules are required for this frame 14 AC drive.

(3) Three AC chokes and NFE modules are required for this frame 14 AC drive.

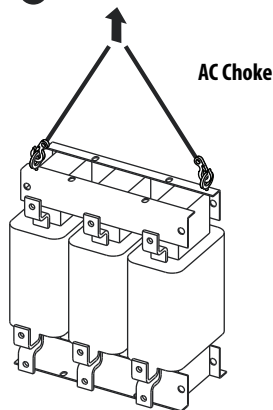
(4) Two du/dt filters are required per frame 14 AC drive.

Lifting Instructions

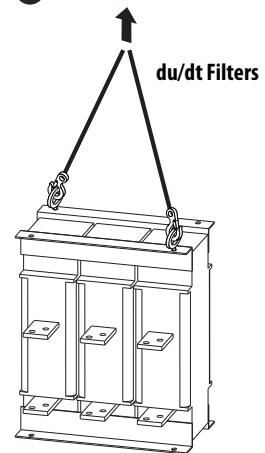
A All Size Drives



B All Size Drives

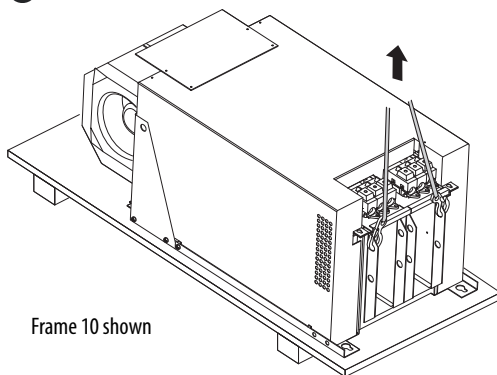


B Frame 14 Drives Only

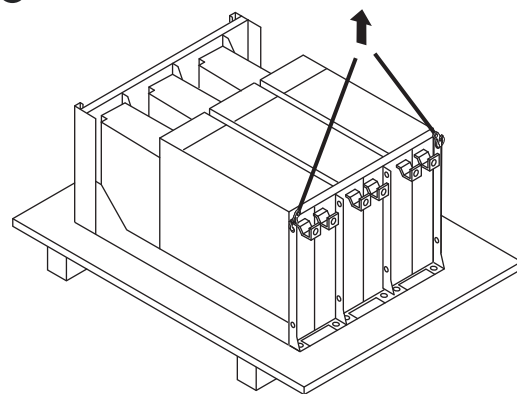


Important: Frame 10...12 power structures can temporarily rest on the cooling fan assembly, but shocks and non-vertical forces may cause damage to the fans.

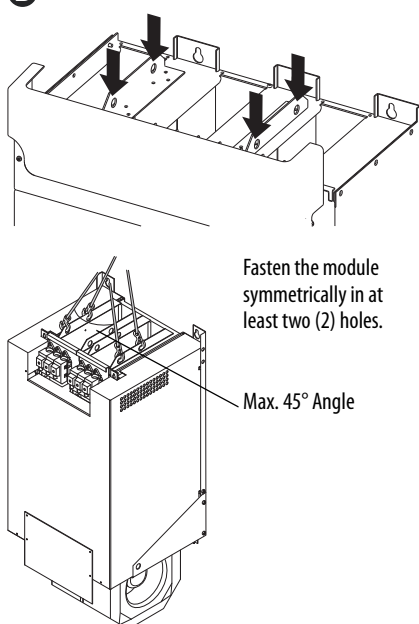
C Frame 10, 11 and 12 Size Drives



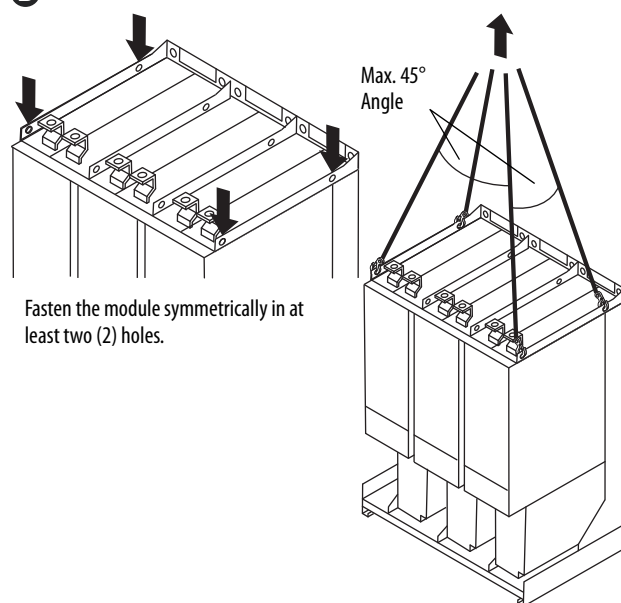
C Frame 13 and 14 Size Drives



D Frame 10, 11 and 12 Size Drives



D Frame 13 and 14 Size Drives



Enclosure Requirements

The following enclosure specifications must be met for proper installation.

Table 6 - Frames 10...12

Specification	Frame 10	Frame 11	Frame 12
Width	600 mm (23.6 in.) Minimum	800 mm (31.5 in.) Minimum	1200 mm (47.2 in.) Minimum
Depth	Minimum 600 mm (23.6 in.) or a minimum of 490 mm (19.3 in.) if the control frame is installed in a position other than the front of the power structure.		
Height	Minimum 1800 mm (70.9 in.) if the AC choke is installed beneath the power structure, otherwise a minimum of 1500 mm (59.1 in.).		
Weight	Enclosure must be able to support the total equipment weight stated if the power structure and AC choke are installed in the same enclosure. Refer to the PowerFlex 700H and 700S AC Drive, Frames 9...14 Installation Instructions, publication PFLEX-IN006 , for component weights.		
Construction	According to EN60439-1		
Ventilation	See Airflow and Ventilation Requirements on page 13 .		

Table 7 - Frame 13

Specification	Frame 13 ⁽¹⁾		
	2 NFE Converters	3 NFE Converters	DC Input
Width	Enclosure A: 600 mm (23.6 in.) min Enclosure B: 800 mm (31.5 in.) min	Enclosures A and B: 800 mm (31.5 in.) min	Enclosure A: 800 mm (31.5 in.) min
Depth	Minimum 600 mm (23.6 in.) is required to accommodate the depth of the inverter units.		
Height	2200 mm (86.6 in.)		
Weight	Enclosure must be able to support the total equipment weight stated if the power structure and AC choke are installed in the same enclosure. Refer to the PowerFlex 700H and 700S AC Drive, Frames 9...14 Installation Instructions, publication PFLEX-IN006 , for component weights.		
Construction	According to EN60439-1		
Ventilation	See Airflow and Ventilation Requirements on page 13 .		

(1) Refer to Frame 13 and 14 Component/Enclosure Configurations on page [11](#) for more information.

Table 8 - Frame 14

Specification	Frame 14 ⁽¹⁾			
	3 NFE Converters	4 NFE Converters	6 NFE Converters	DC Input
Width	Enclosures A, B and C: 800 mm (31.5 in.) Min.	Enclosures A and D: 600 mm (23.6 in.) Min. Enclosure B and C: 800 mm (31.5 in.) Min.	Enclosures A, B, C, and D: 800 mm (31.5 in.) Min.	Enclosures A and B: 800 mm (31.5 in.) Min.
Depth	Minimum 600 mm (23.6 in.) is required to accommodate the depth of the inverter units.			
Height	2200 mm (86.6 in.)			
Weight	Enclosure must be able to support the total equipment weight stated if the power structure and AC choke are installed in the same enclosure. Refer to the PowerFlex 700H and 700S AC Drive, Frames 9...14 Installation Instructions, publication PFLEX-IN006 , for component weights.			
Construction	According to EN60439-1			
Ventilation	See Airflow and Ventilation Requirements on page 13 .			

(1) Refer to Frame 13 and 14 Component/Enclosure Configurations on page [11](#) for more information.

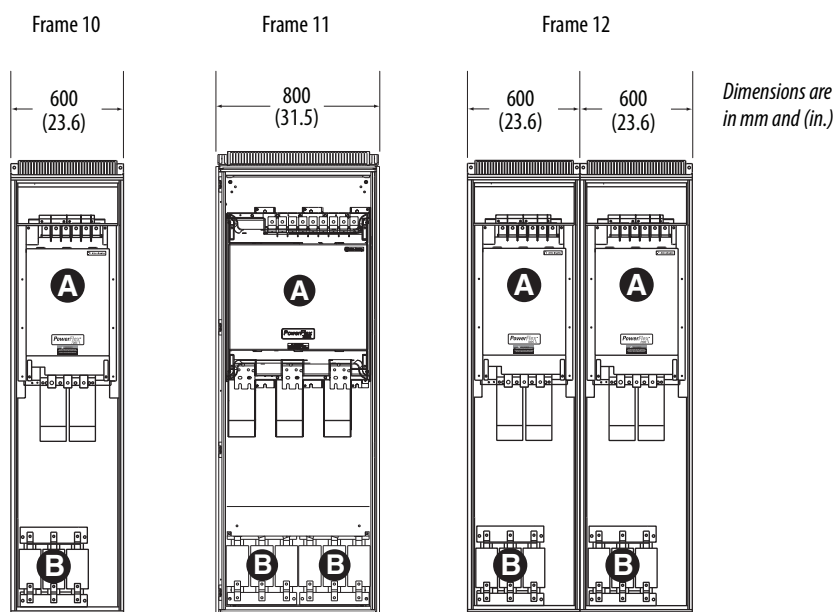
Frame 10...12 Component/Enclosure Configurations

The figures below are examples of typical installations based on the number of components installed for a Frame 10...12 drive.

A NFE Converter(s) and Inverter(s)

B AC Choke

Figure 1 - Frame 10...12 Enclosure Configuration Examples



Frame 13 and 14 Component/Enclosure Configurations

Frame 13 and 14 power structures are comprised of multiple NFE converters, inverters, AC chokes and du/dt filters (frame 14 only). Therefore several enclosures are required for proper installation. The figures below are examples of typical installations based on the number of components installed for a drive.

A NFE Converter

B AC Choke

C Inverter

D du/dt Filter

Figure 2 - Frame 13 with Two NFE Converters

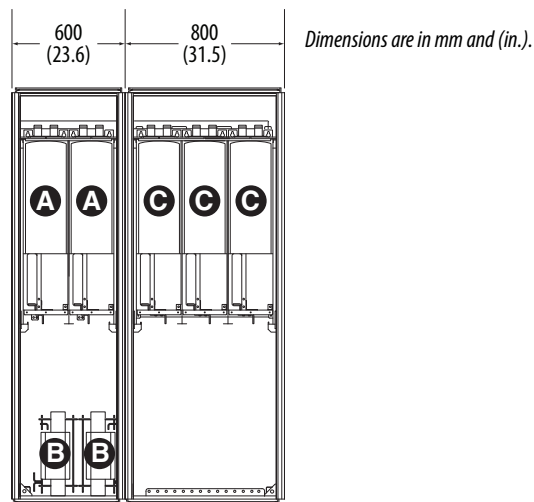


Figure 3 - Frame 13 with Three NFE Converters

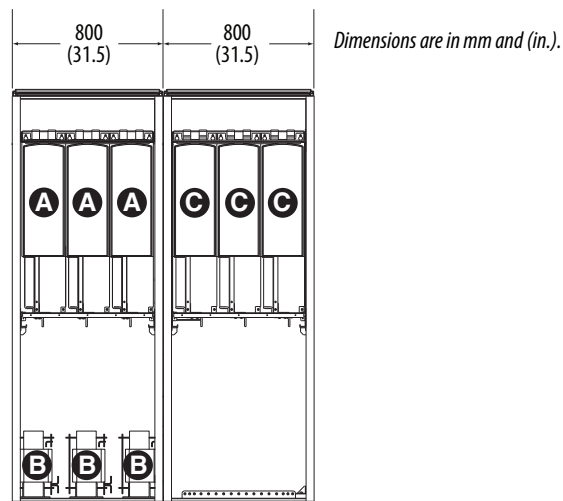


Figure 4 - Frame 14 with Three NFE Converters

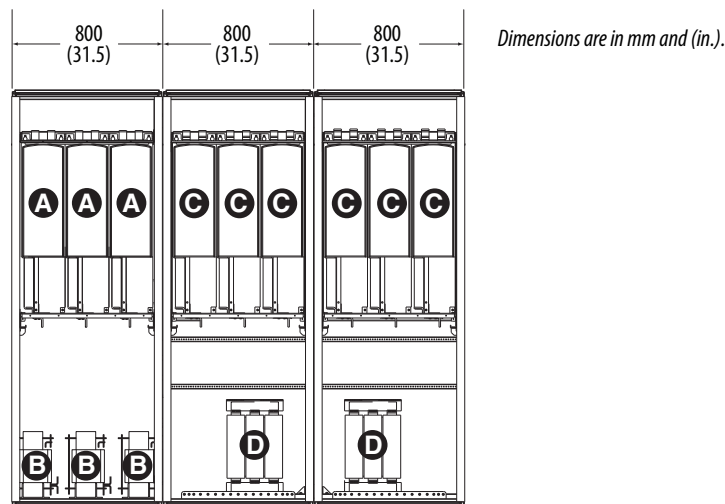


Figure 5 - Frame 14 with Four NFE Converters

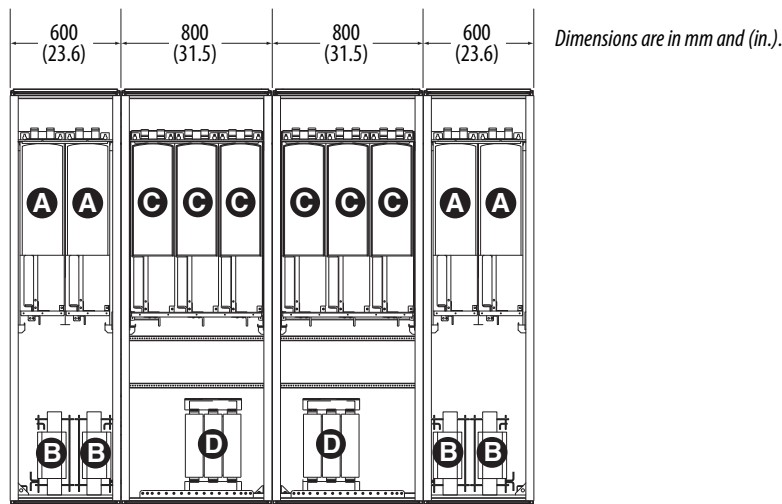
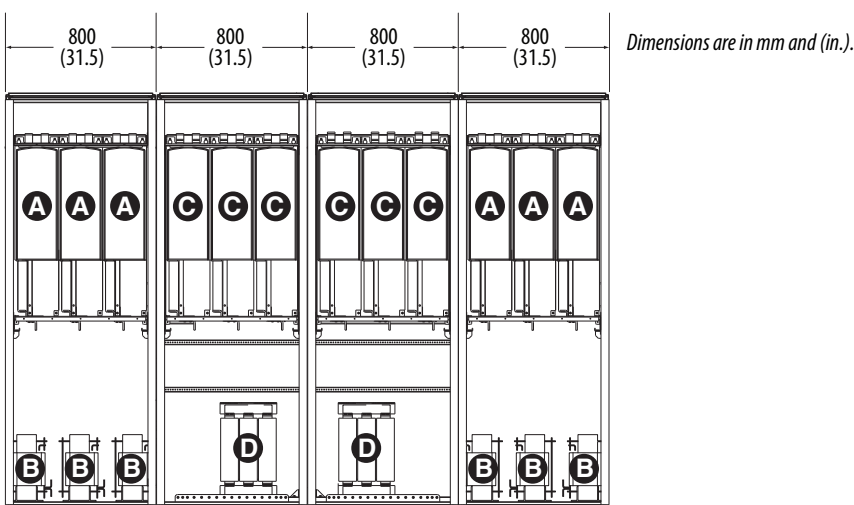


Figure 6 - Frame 14 with Six NFE Converters



Airflow and Ventilation Requirements



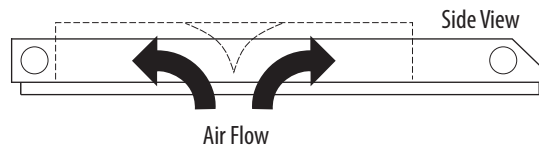
ATTENTION: To guard against equipment damage caused by excessive heat, proper airflow must be available at all times. Refer to the guidelines below.

During drive operation, air is circulated by fans at the bottom of the power structure. If the structure is placed in the upper portion of the enclosure, the fan will be in the middle portion of the enclosure. Therefore, to achieve sufficient cooling of the drive, each enclosure must provide:

- Openings for cooling air intake in the door/front panel at and/or below the level of the fans.
- Openings for hot air exhaust at the top of the enclosure.

IMPORTANT To allow free air circulation, the protective screen/cover at the bottom of the enclosure must be a mesh sheet metal screen. Additionally, the busbar screen/cover and choke upper support must be equipped with holes.

IMPORTANT If a flat roof is used, mount a V-shaped air guide on the underside of the roof to direct the air flow horizontally.



Ventilation

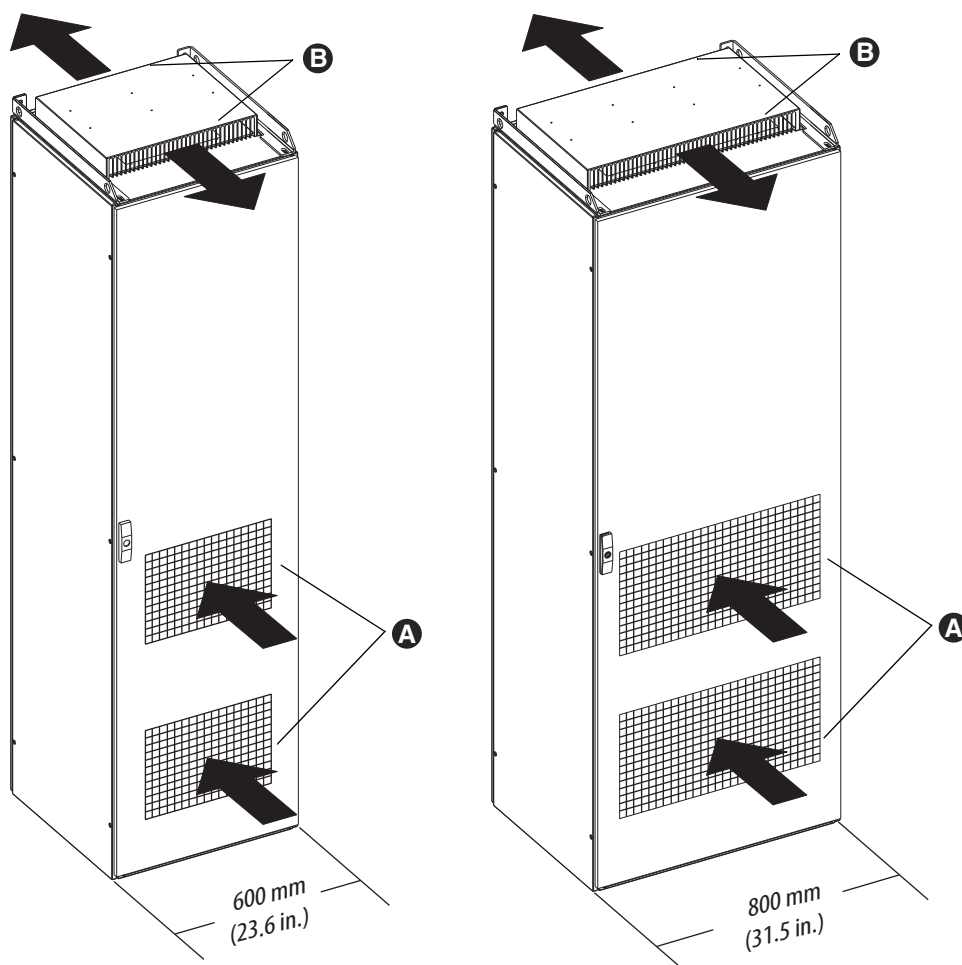
The ventilation openings must fulfill the requirements set by the selected IP class. The examples in this manual apply to protection class IP21. [Table 9](#) contains the minimum required air opening dimensions. Refer to [Figure 7](#) for the location of the openings as indicated in the table below.

Table 9 - IP21 Ventilation Opening Minimum Requirements

Opening	Purpose	Enclosure Width ⁽¹⁾	
		600 mm (23.6 in.)	800 mm (31.5 in.)
A	Area for cool air intake	130,050 mm ²	195,075 mm ²
B	Area for hot air exhaust	70,000 mm ²	105,000 mm ²

(1) Refer to Enclosure Requirements on page 9 for the required enclosure widths for each drive frame size.

Figure 7 - Enclosure Ventilation Example



Directing the Internal Airflow

Cooling air must enter the enclosure through the ventilation openings on the door and be exhausted out the top of the enclosure. To direct the hot air from the power structure to the outlet at the top of the enclosure and prevent it from circulating back to the fan, use either of the following arrangements:

- ① Install a closed air duct from the power structure to the outlet on top of the enclosure.
- ② Install shields in the gaps between the power structure and the enclosure walls. Place the shields above the air outlet gaps at the structure sides.

IMPORTANT For drives that require multiple enclosures mounted side-by-side with openings between the upper portions of the enclosures, shields must be installed between enclosures to ensure proper air flow.

IMPORTANT The shields inside the enclosure must be located such that they prevent hot output air from mixing with the cooler incoming air.

Figure 8 - 600 mm (23.6 in.) Enclosure Air Recirculation Restriction Example

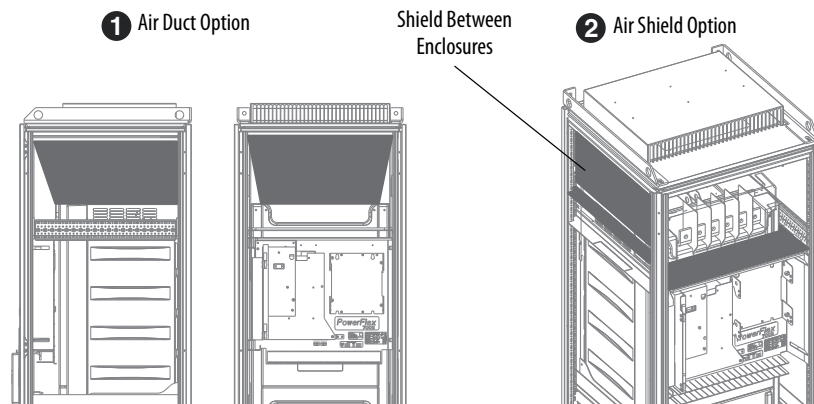
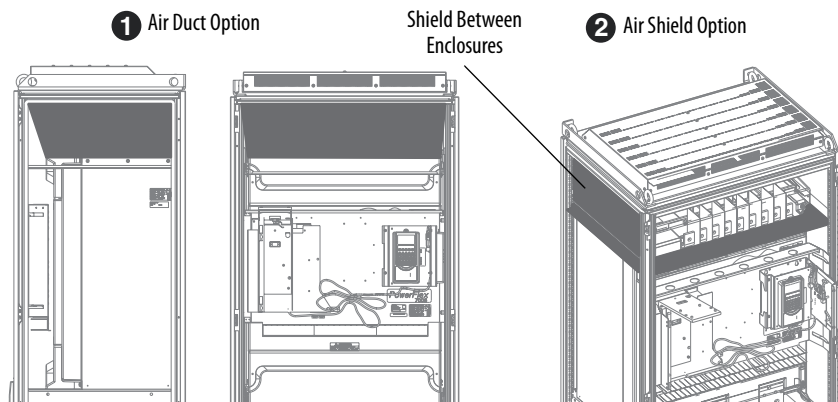


Figure 9 - 800 mm (31.5 in.) Enclosure Air Recirculation Restriction Example



Heat Dissipation

The efficiency of the frequency converter is a function of switching frequency, operating frequency and load. Based on this information, heat dissipation can be calculated at a certain operating point. For most cases the following general formula based on frequency converter load can be used to estimate the heat dissipation of the power structure:

$$P_{\text{loss}} \text{ (kW)} = P_{\text{mot}} \text{ (kW)} \times 0.025$$

Watts Loss

Table 10 - 400 and 480V AC Input Drive Watts Loss Data

Drive Catalog Number ⁽¹⁾	Output Amps ⁽²⁾	480V AC Input (20xD) ⁽³⁾		400V AC Input (20xC) ⁽³⁾		Frame	Watts Loss
		ND HP	HD HP	ND kW	HD kW		
20x385N	385 (300)	300	250	200	160	10	4320
20xy460N	460 (385)	350	300	250	200	10	5335
20xy500N	500 (420)	450	350	250	250	10	5921
20xy590N	590 (520)	500	450	315	250	11	6620
20xy650N	650 (590)	500	500	355	315	11	7538
20xy730N	730 (650)	600	500	400	355	11	8312
20xy820N	820 (730)	700	600	450	400	12	9201
20xy920N	920 (820)	800	700	500	450	12	10670
20xy1K0N	1030 (920)	900	800	560	500	12	11729
20xy1K1N	1150 (1030)	1000	900	630	560	13	13801
20xy1K3N	1300 (1150)	1200	1000	710	630	13	15077
20xy1K4N	1450 (1200)	1250	1000	800	710	13	16511
20xy1K7N	1770 (1600)	1500	1400	1000	900	14	24800
20xy2K1N	2150 (1940)	1900	1700	1200	1100	14	29900
20xy2K7N	2700 (2300)	2300	2000	1600	1300	14	39680

(1) Refer to rating columns for catalog number explanation.

(2) These drives have dual current ratings; one for normal duty applications, and one for heavy duty (in parenthesis). The drive may be operated at either rating.

(3) x = "D" for PowerFlex 700S and "C" for PowerFlex 700H.

Table 11 - 600 and 690V AC Input Drive Watts Loss Data

Drive Catalog Number ⁽¹⁾	Output Amps ⁽²⁾	600V AC Input (20xE) ⁽³⁾		690V AC Input (20xF) ⁽³⁾		Frame	Watts Loss
		ND HP	HD HP	ND kW	HD kW		
20xy261N	261 (208)	250	200	250	200	10	4206
20xy325N	325 (261)	350	250	315	250	10	4751
20xy385N	385 (325)	400	350	355	315	10	5527
20xy416N	416 (325)	450	350	400	315	10	5622
20xy460N	460 (385)	450	400	450	355	11	6345
20xy502N	502 (460)	500	450	500	450	11	6925
20xy590N	590 (502)	600	500	560	500	11	7539
20xy650N	650 (590)	700	650	630	560	12	9502
20xy750N	750 (650)	800	700	710	630	12	10570
20xy820N	820 (750)	900	700	800	630	12	11082
20xy920N	920 (820)	1000	900	900	800	13	12690
20xy1K0N	1030 (920)	1100	1000	1000	900	13	15907
20xy1K1N	1180 (1030)	1300	1100	1100	1000	13	17306
20xy1K5N	1500 (1300)	1600	1400	1500	1300	14	22500
20xy1K9N	1900 (1500)	2000	1600	1800	1500	14	28500
20xy2K2N	2250 (1900)	2400	2000	2000	1800	14	33400

(1) Refer to rating columns for catalog number explanation.

(2) These drives have dual current ratings; one for normal duty applications, and one for heavy duty (in parenthesis). The drive may be operated at either rating.

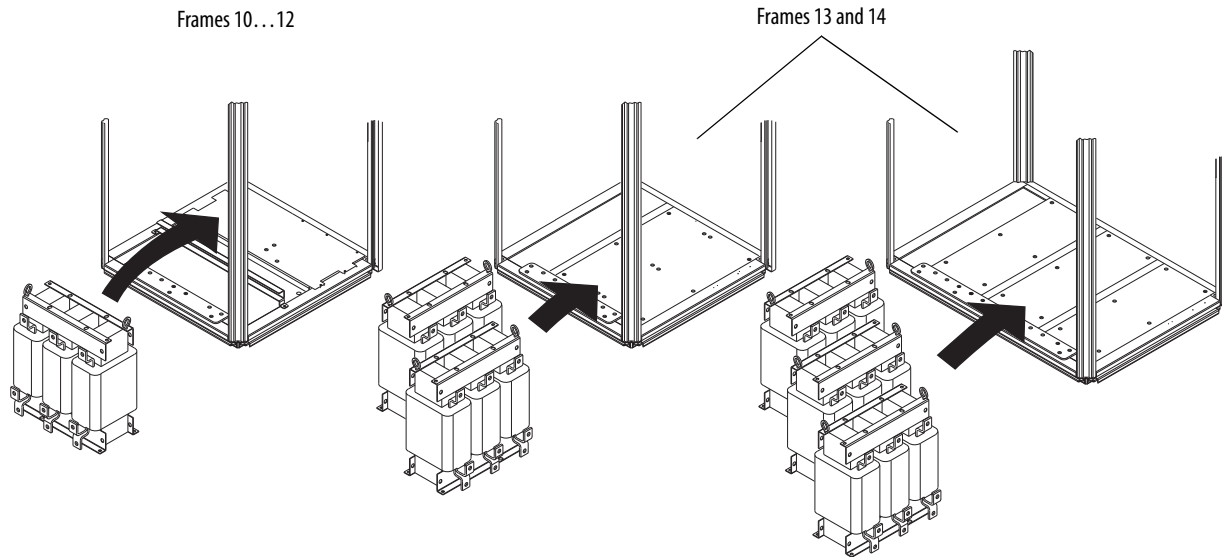
(3) x = "E" for PowerFlex 700S and "F" for PowerFlex 700H.

AC Choke Installation

For Frame 10...12 drives, the recommended location for the AC choke(s) is at the bottom of the enclosure, as close to the rear wall as possible. For frame 13 and 14 drives, the recommended location for the AC chokes is at the bottom of the same enclosure as the NFE converters, also as close to the rear wall as possible. If a fuse switch will be installed, choke placement may vary to accommodate the switch.

Secure the choke on an assembly plate or by using mounting rails. See [Figure 10](#) below. Refer to Component Dimensions on page [53](#) for more details.

Figure 10 - Recommended AC Choke Mounting Location



IMPORTANT

An upper support plate must be installed above the choke(s) if the enclosure is transported in a horizontal position. Any fixed support plate must be equipped with air circulation holes.

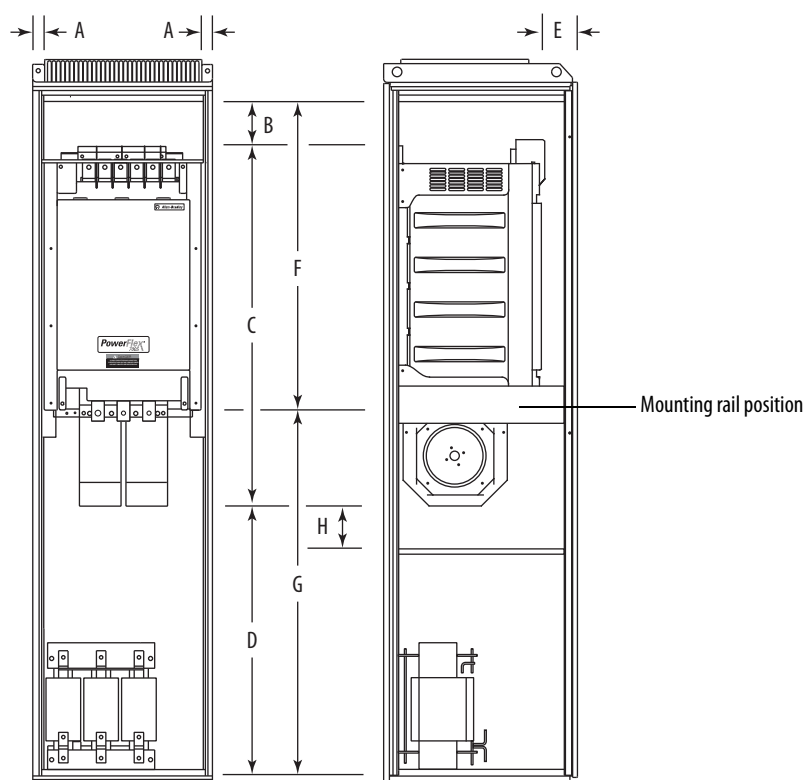
Power Structure Installation Preparing the Enclosure

Frames 10...12

To facilitate ease of service, it is recommended that the power structure be mounted on support rails. Fasten the rails to the sides of the enclosure at distances “F” (from the top) and “G” (from the bottom) shown in [Figure 11](#) (below). Leave a space (“A”) between the structure and side walls for internal cooling air flow. When two enclosures are utilized for a Frame 12 installation, space between the enclosures is not required.

The power structure should be secured to the rear of the enclosure as shown by installing two rails on the rear wall of the enclosure at the appropriate levels. Refer to the dimension drawings in Component Dimensions beginning on page [53](#) for more details.

Figure 11 - Mounting Dimensions - Frames 10...12



Frame	Dimensions - mm (in.)							
	A	B	C	D ⁽¹⁾	E ⁽²⁾	F ⁽³⁾	G ⁽⁴⁾	H ⁽⁵⁾
10...12	50 (2.0)	100 (4.0)	1120 (44.1)	550 (21.7)	116 (4.6)	918 (36.1)	850 (33.5)	50 (2.0)

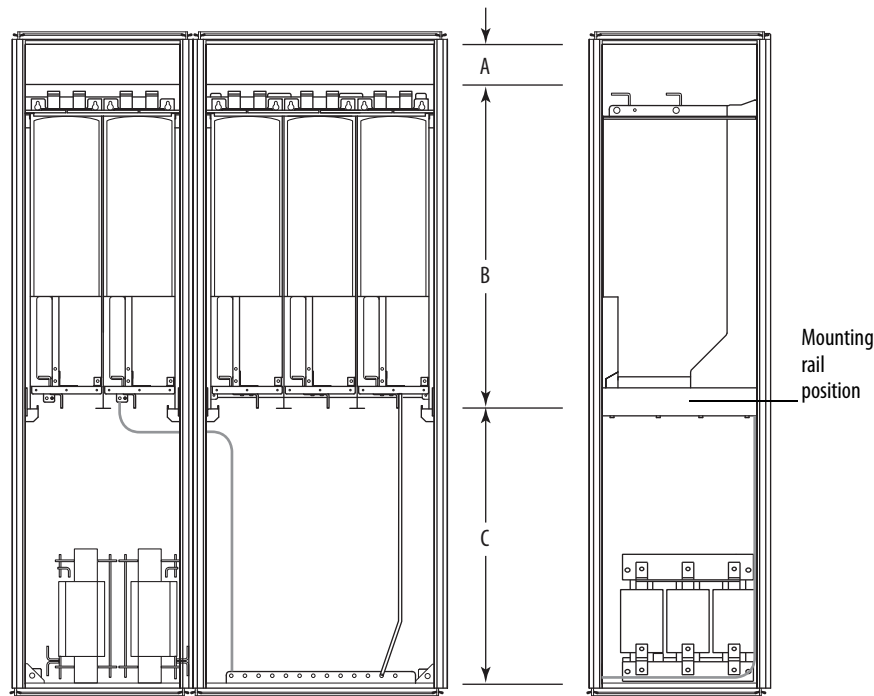
- (1) Dimension if the AC choke is installed at the bottom of the enclosure. If the choke is installed in another location, the distance must be greater than 290 mm (11.4 in.).
- (2) Minimum distance from the enclosure door. This allows installation of the control frame in front of the power structure. If the control frame is installed in any other location, this dimension must be a minimum of 44 mm (1.7 in.).
- (3) Minimum distance from the top of the mounting rails to the top of the enclosure.
- (4) Minimum distance from the top of the mounting rails to the enclosure floor. If the choke is installed in another location, the distance must be greater than 590 mm (23.2 in.).
- (5) Fan removal clearance.

Frames 13 and 14

To facilitate ease of service, it is recommended that the power structure be mounted on support rails. Fasten the rails to the sides of the enclosure at distances “B” (from the top) and “C” (from the bottom) shown in [Figure 11](#). Leave a space (“A”) between the power structure and top of the enclosure for internal cooling air flow. Space between the enclosures is not required.

The power structure should be secured to the rear of the enclosure as shown by installing two rails on the rear wall of the enclosure at appropriate levels. Refer to the dimension drawings in Component Dimensions beginning on page [53](#) for more details.

Figure 12 - Mounting Dimensions - Frames 13 and 14



Frame	Dimensions - mm (in.)		
	A ⁽¹⁾	B	C ⁽²⁾
13 and 14	175 (6.9)	1050 (41.3)	600 (23.6)

- (1) Minimum distance from the top of the enclosure; this space is required for the DC busbars.
(2) Dimension if the AC choke is installed at the bottom of the enclosure. If the choke is installed in another location, the distance must be greater than 300 mm (11.8 in.).

Mounting the Power Structure(s)



ATTENTION: To guard against personal injury and/or equipment damage, ensure that the enclosure is properly supported to prevent tipping.

Frames 10...12

IMPORTANT

If the space around the power structure is limited, route the internal power cables along the wall and secure them in brackets before mounting the power structure.

Secure each power structure to the rear wall of the enclosure using the mounting holes in the frame. Refer to the dimension drawings in Component Dimensions beginning on page [53](#) for more details.

Frames 13 and 14

Secure each power structure to the rear wall of the enclosure using the mounting holes in the frame. Installation of a mounting bar on the rear wall of the enclosure may be required. Two supports should also be installed on the sides of each enclosure, allowing a resting point for the structures. Refer to the dimension drawings in Component Dimensions beginning on page [53](#) for more details.

Recommended Power Structure Grounding

Install a PE rail, at the bottom front of the enclosure. Grounding cable must be copper.

IMPORTANT

The PE rail must be connected to external ground at the installation site according to local regulations.

Refer to the PowerFlex 700H and 700S AC Drive, Frames 9-14 Installation Instructions, publication [PFLEX-IN006](#), for further details.

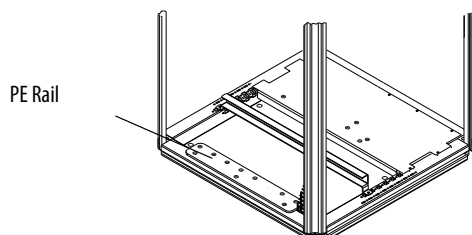
Frames 10...12

Connect a grounding cable from the ground connector at the lower right hand side of the power structure frame to the PE rail of the enclosure.

Frames 13 and 14

Route a grounding cable from the ground connector of the rectifying structure and power structure to the PE rail.

Figure 13 - Power Structure Grounding Example



Internal Power Wiring

When cables are used for power wiring, they must be copper and rated at 90° C (194° F). For frames 13 and 14 drives, power connections between the AC choke and the NFE converters are typically made using busbars, however, copper cables may be used.



ATTENTION: The following information is merely a guide for proper installation. Rockwell Automation, Inc. cannot assume responsibility for the compliance or the noncompliance to any code, national, local or otherwise for the proper installation of this drive or associated equipment. A hazard of personal injury and/or equipment damage exists if codes are ignored.

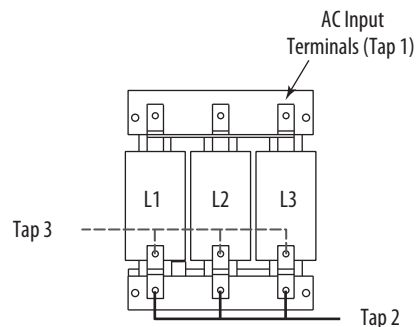
Drives with Parallel Power Structures

Drives can contain one to six converters. Each converter contains a set of input power terminals. When parallel power structures are present, you must supply power to all sets of input terminals on these drives. Refer to [Table 1](#) and [Table 2](#) on page 3 for the number of converters provided with each drive.

IMPORTANT Parallel wiring must have the same cable dimensions, type and routing. Non-symmetrical wiring may cause unequal loading between the converters and reduce the drive's ability to deliver current to the motor.

Connect power cables (L1, L2, L3) between the appropriate output terminals of the AC choke and the input terminals of the power structure. Note that multiple cables per phase may be required. Refer to [Figure 14](#) and [Figure 15](#) on page 22 for cable/busbar routing examples.

IMPORTANT The choke has two sets of output terminals designed for different voltages. Tap 1 is the incoming line connection. Tap 2 or 3 is used to connect to the drive input. Refer to [Table 1](#) and [Table 2](#) on page 3 for specific tap connections.



IMPORTANT Busbar alignment should be vertical to allow the maximum flow of cooling air through the enclosure.

Figure 14 - Frame 10...12 Cable Routing Example (Frame 10 Shown)

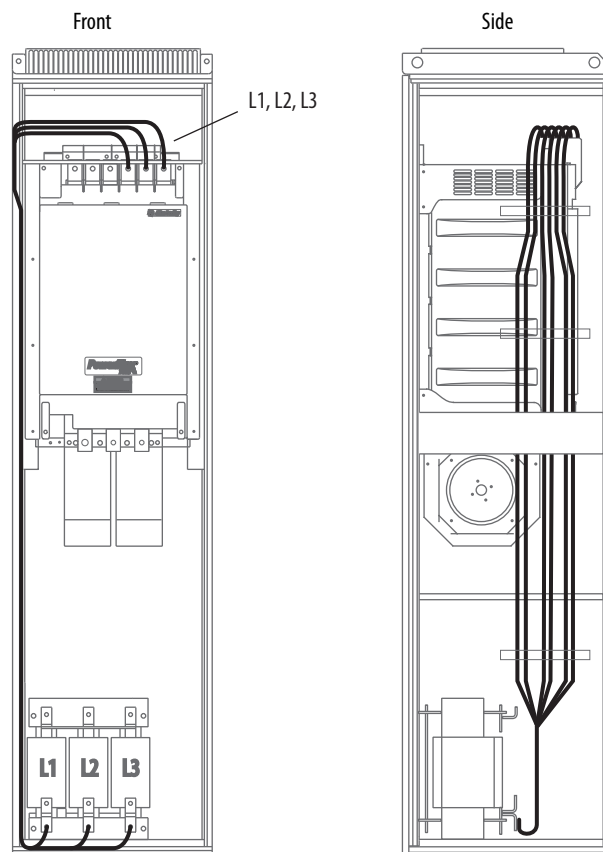
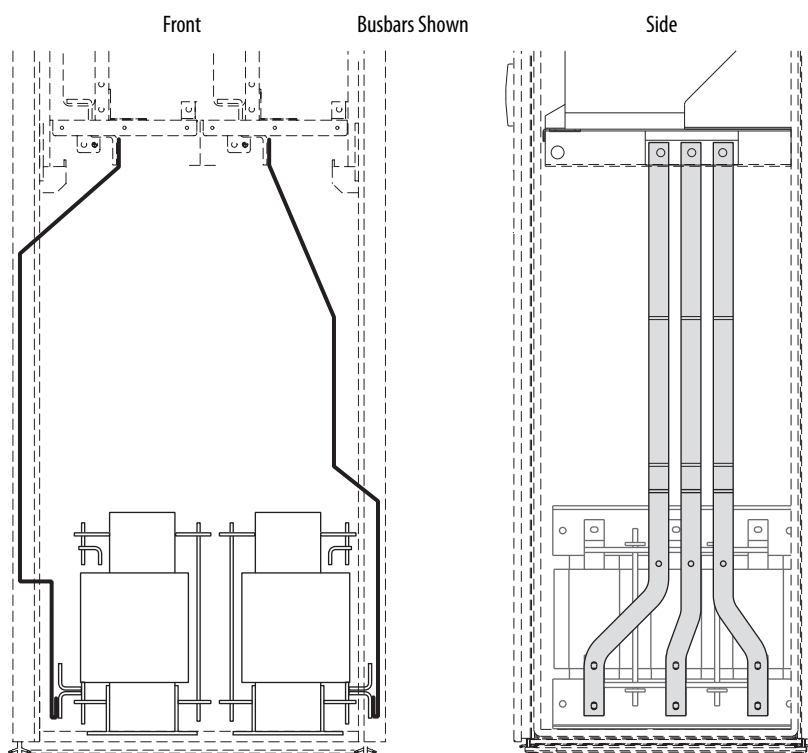


Figure 15 - Frames 13 and 14 AC Choke to NFE Converters Cables/Busbars



Frames 13 and 14

Power connections between the NFE converter and inverter power structures must be made using busbars.

IMPORTANT Busbar alignment should be vertical to allow the maximum flow of cooling air through the enclosure.

IMPORTANT The DC bus requires user supplied fusing. See Fusing and Circuit Breakers on page [24](#) for details.

Figure 16 - Frame 13 DC Busbar and Fuse Placement

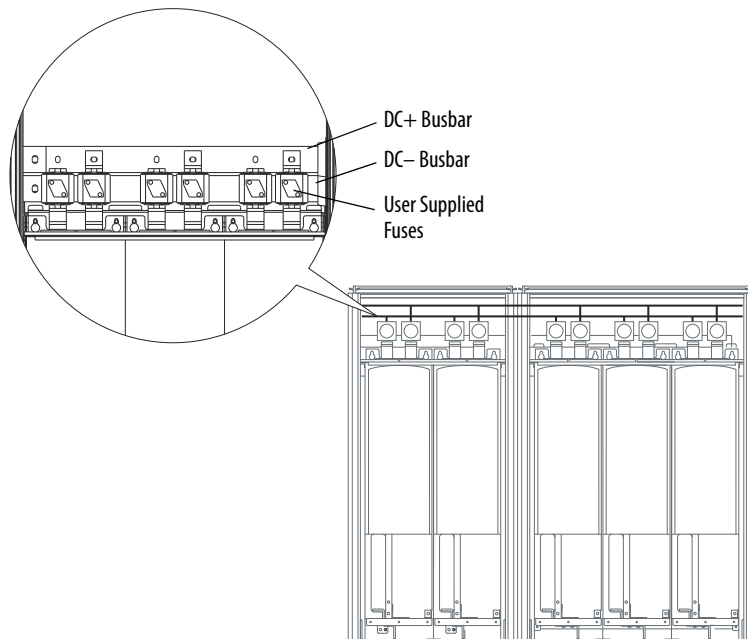
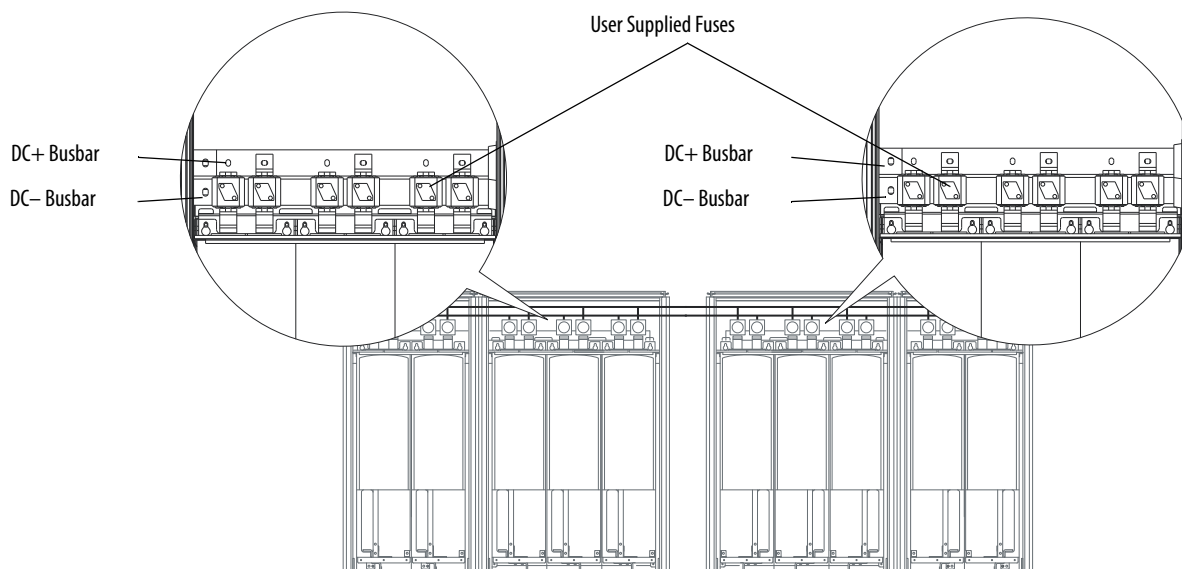


Figure 17 - Frame 14 DC Busbar and Fuse Placement



Electronic Motor Overload Protection

PowerFlex 700H and PowerFlex 700S drives provide Class 10 motor overload protection according to NEC article 430 and motor over-temperature protection according to NEC article 430.126 (A)(2). UL 508C File E59272.

Short Circuit Current Rating

Maximum short circuit current rating: 200,000 Amps symmetrical.

Branch Circuit Short Circuit Protection

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the NEC and any additional local codes, or the equivalent.

Fusing and Circuit Breakers

The tables on the following pages provide recommended AC line input fuse and circuit breaker information. See Fusing and Circuit Breakers below for UL and IEC requirements. Sizes listed are the recommended sizes based on 40 °C (104 °F) and the U.S. NEC. Other country, state, or local codes can require different ratings. Tables with DC link fuse recommendations for DC input drives are also provided.

Fusing

The recommend fuse types are listed below. If available current ratings do not match those listed in the tables provided, chose the next higher fuse rating.

- IEC – BS88 (British Standard) Parts 1 & 2, EN60269-1, Parts 1 & 2⁽¹⁾, type gG or equivalent should be used.
- UL - UL requirements specify that UL Class CC, T, or J fuses must be used for all drives in this section.

Circuit Breakers

The “non-fuse” listings in the following tables include inverse time circuit breakers and instantaneous trip circuit breakers (motor circuit protectors). If one of these is chosen as the desired protection method, the following requirements apply:

- IEC – Both types of circuit breakers are acceptable for IEC installations.
- UL - Only inverse time circuit breakers are acceptable for UL installations.

(1) Typical designations include, but may not be limited to the following; Parts 1 & 2: AC, AD, BC, BD, CD, DD, ED, EFS, EF, FF, FG, GF, GG, GH.

Table 12 - 400V AC Input Protection Devices

Drive Catalog Number	Frame	kW Rating		Input Ratings Amps	Dual Element Time Delay Fuse		Non-Time Delay Fuse		Bussmann Style Semi-Conductor Fuse	Circuit Breaker ⁽⁵⁾	Motor Circuit Protector ⁽⁷⁾
		ND	HD		Min. ⁽²⁾	Max. ⁽³⁾	Min. ⁽²⁾	Max. ⁽³⁾		Max. ⁽⁶⁾	Max.
20xC385	10	200	-	388	500	850	500	1100	170M5813	1100	600
		-	160	302	400	650	400	900	170M5813	900	400
20xC460	10	250	-	463	600	1000	600	1300	170M8547	1300	600
		-	200	388	500	850	500	1100	170M8547	1100	600
20xC500	10	250	-	504	650	1100	650	1500	170M8547	1500	700
		-	250	423	550	900	550	1200	170M8547	1200	600
20xC590	11	315	-	594	750 (1 per phs) 375 (2 per phs)	1300	750 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
		-	250	524	700 (1 per phs) 350 (2 per phs)	1100	700 (1 per phs) 350 (2 per phs)	1500	170M5813	1500	700
20xC650	11	355	-	655	850 (1 per phs) 425 (2 per phs)	1400	850 (1 per phs) 425 (2 per phs)	1900	170M5813	1900	1000
		-	315	594	750 (1 per phs) 375 (2 per phs)	1300	750 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
20xC730	11	400	-	735	1000 (1 per phs) 500 (2 per phs)	1600	1000 (1 per phs) 500 (2 per phs)	2100	170M5813	2100	1200
		-	355	655	850 (1 per phs) 425 (2 per phs)	1400	850 (1 per phs) 425 (2 per phs)	1900	170M5813	1900	1000
20xC820	12	450	-	826	1100 (1 per phs) 550 (2 per phs)	1800	1100 (1 per phs) 550 (2 per phs)	2400	170M8547	2400	1200
		-	400	735	1000 (1 per phs) 500 (2 per phs)	1600	1000 (1 per phs) 500 (2 per phs)	2100	170M8547	2100	1200
20xC920	12	500	-	927	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M8547	2700	1200
		-	450	826	1100 (1 per phs) 550 (2 per phs)	1800	1100 (1 per phs) 550 (2 per phs)	2400	170M8547	2400	1200
20xC1K0	12	560	-	1038	1350 (1 per phs) 700 (2 per phs)	2300	1350 (1 per phs) 700 (2 per phs)	3000	170M8547	3000	1400
		-	500	927	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M8547	2700	1200
20xC1K1	13	630	-	1158	1350 (1 per phs) 700 (2 per phs)	2300	1350 (1 per phs) 700 (2 per phs)	3000	170M6466 ⁽⁴⁾	3000	1400
		-	560	1038	1500 (1 per phs) 750 (2 per phs)	2500	1500 (1 per phs) 750 (2 per phs)	3400	170M6466 ⁽⁴⁾	3400	1500
20xC1K3	13	710	-	1310	1700 (1 per phs) 850 (2 per phs)	2900	1700 (1 per phs) 850 (2 per phs)	3900	170M6466 ⁽⁴⁾	3900	1700
		-	630	1158	1500 (1 per phs) 750 (2 per phs)	2500	1500 (1 per phs) 750 (2 per phs)	3400	170M6466 ⁽⁴⁾	3400	1500
20xC1K4	13	800	-	1461	1900 (1 per phs) 950 (2 per phs)	3000	1900 (1 per phs) 950 (2 per phs)	4300	170M6466 ⁽⁴⁾	4300	1900
		-	710	1209	1600 (1 per phs) 800 (2 per phs)	2700	1600 (1 per phs) 800 (2 per phs)	3600	170M6466 ⁽⁴⁾	3600	1600
20xC1K7 ⁽¹⁾	14	1000	-	1783	2500 (1 per phs) 825 (3 per phs)	3900	2500 (1 per phs) 825 (3 per phs)	5300	170M6466	5300	2500
		-	900	1612	2100 (1 per phs) 700 (3 per phs)	3500	2100 (1 per phs) 700 (3 per phs)	4800	170M6466	4800	2100
20xC2K1 ⁽¹⁾	14	1200	-	2166	3000 (1 per phs) 1000 (3 per phs)	4800	3000 (1 per phs) 1000 (3 per phs)	6400	170M6466	6400	3000
		-	1100	1954	2500 (1 per phs) 825 (3 per phs)	4300	2500 (1 per phs) 825 (3 per phs)	5800	170M6466	5800	2500
20xC2K7 ⁽¹⁾	14	1600	-	2720	3500 (1 per phs) 1200 (3 per phs)	6000	3500 (1 per phs) 1200 (3 per phs)	8000	170M6466	8000	3500
		-	1300	2317	3000 (1 per phs) 1000 (3 per phs)	5000	3000 (1 per phs) 1000 (3 per phs)	6900	170M6466	6900	3000

(1) Not available with 700S Control.

(2) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.

(3) Maximum protection device size is the highest rated device that supplies drive protection.

(4) These fuses and disconnect are supplied with AC input NEMA/UL Type 1 drives.

(5) Inverse time breaker. Ratings shown are maximum.

(6) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.

(7) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC minimum size is 125% of motor/drive FLA. Ratings shown are suggested. Instantaneous trip settings must be set to US NEC code. Not to exceed 1300% FLA.

Table 13 - 480V AC Input Protection Devices

Drive Catalog Number	Frame	HP Rating		Input Ratings Amps	Dual Element Time Delay Fuse		Non-Time Delay Fuse		Bussmann Style Semi-Conductor Fuse	Circuit Breaker ⁽⁵⁾	Motor Circuit Protector ⁽⁷⁾
		ND	HD		Min. ⁽²⁾	Max. ⁽³⁾	Min. ⁽²⁾	Max. ⁽³⁾		Max. ⁽⁶⁾	Max.
20xD385	10	300	-	372	500	850	500	1100	170M5813	1100	600
		-	250	302	400	650	400	900	170M5813	900	400
20xD460	10	350	-	444	600	1000	600	1300	170M8547	1300	600
		-	300	388	500	850	500	1100	170M8547	1100	600
20xD500	10	450	-	483	650	1000	650	1500	170M8547	1500	700
		-	350	423	550	900	550	1200	170M8547	1200	600
20xD590	11	500	-	570	750 (1 per phs) 375 (2 per phs)	1300	750 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
		-	450	524	700 (1 per phs) 350 (2 per phs)	1100	700 (1 per phs) 350 (2 per phs)	1500	170M5813	1500	700
20xD650	11	500	-	628	800 (1 per phs) 400 (2 per phs)	1400	800 (1 per phs) 400 (2 per phs)	1900	170M5813	1900	800
		-	500	594	750 (1 per phs) 375 (2 per phs)	1300	750 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
20xD730	11	600	-	705	900 (1 per phs) 450 (2 per phs)	1600	900 (1 per phs) 450 (2 per phs)	2100	170M5813	2100	900
		-	500	655	850 (1 per phs) 425 (2 per phs)	1400	850 (1 per phs) 425 (2 per phs)	1900	170M5813	1900	900
20xD820	12	700	-	792	1000 (1 per phs) 500 (2 per phs)	1800	1000 (1 per phs) 500 (2 per phs)	2400	170M8547	2400	1000
		-	600	735	900 (1 per phs) 475 (2 per phs)	1600	900 (1 per phs) 475 (2 per phs)	2100	170M8547	2100	1000
20xD920	12	800	-	888	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M8547	2700	1200
		-	700	826	1100 (1 per phs) 550 (2 per phs)	1800	1100 (1 per phs) 550 (2 per phs)	2400	170M8547	2400	1200
20xD1K0	12	900	-	994	1300 (1 per phs) 650 (2 per phs)	2300	1300 (1 per phs) 650 (2 per phs)	3000	170M8547	3000	1300
		-	800	927	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M8547	2700	1200
20xD1K1	13	1000	-	1110	1400 (1 per phs) 700 (2 per phs)	2500	1400 (1 per phs) 700 (2 per phs)	3400	170M6466 ⁽⁴⁾	3400	1400
		-	900	994	1300 (1 per phs) 650 (2 per phs)	2300	1300 (1 per phs) 650 (2 per phs)	3000	170M6466 ⁽⁴⁾	3000	1300
20xD1K3	13	1200	-	1255	1600 (1 per phs) 800 (2 per phs)	2900	1600 (1 per phs) 800 (2 per phs)	3900	170M6466 ⁽⁴⁾	3900	1600
		-	1000	1110	1400 (1 per phs) 700 (2 per phs)	2500	1400 (1 per phs) 700 (2 per phs)	3400	170M6466 ⁽⁴⁾	3400	1400
20xD1K4	13	1250	-	1400	1800 (1 per phs) 900 (2 per phs)	3200	1800 (1 per phs) 900 (2 per phs)	4300	170M6466 ⁽⁴⁾	4300	1800
		-	1000	1158	1500 (1 per phs) 750 (2 per phs)	2700	1500 (1 per phs) 750 (2 per phs)	3600	170M6466 ⁽⁴⁾	3600	1500
20xD1K7 ⁽¹⁾	14	1500	-	1709	2200 (1 per phs) 750 (3 per phs)	3800	2200 (1 per phs) 750 (3 per phs)	5300	170M6466	5300	2200
		-	1400	1545	2000 (1 per phs) 675 (3 per phs)	3600	2000 (1 per phs) 675 (3 per phs)	4800	170M6466	4800	2000
20xD2K1 ⁽¹⁾	14	1900	-	2076	2600 (1 per phs) 900 (3 per phs)	4800	2600 (1 per phs) 900 (3 per phs)	6400	170M6466	6400	2600
		-	1700	1873	2400 (1 per phs) 800 (3 per phs)	4300	2400 (1 per phs) 800 (3 per phs)	5800	170M6466	5800	2400
20xD2K7 ⁽¹⁾	14	2300	-	2607	3000 (1 per phs) 1100 (3 per phs)	6000	3000 (1 per phs) 1100 (3 per phs)	8000	170M6466	8000	3300
		-	2000	2220	2800 (1 per phs) 900 (3 per phs)	5000	2800 (1 per phs) 900 (3 per phs)	6900	170M6466	6900	2800

(1) Not available with 700S Control.

(2) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.

(3) Maximum protection device size is the highest rated device that supplies drive protection.

(4) These fuses and disconnect are supplied with AC input NEMA/UL Type 1 drives.

(5) Inverse time breaker. Ratings shown are maximum.

(6) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.

(7) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC minimum size is 125% of motor/drive FLA. Ratings shown are suggested. Instantaneous trip settings must be set to US NEC code. Not to exceed 1300% FLA.

Table 14 - 600V AC Input Protection Devices

Drive Catalog Number	Frame	HP Rating		Input Ratings Amps	Dual Element Time Delay Fuse		Non-Time Delay Fuse		Bussmann Style Semi-Conductor Fuse	Circuit Breaker ⁽⁶⁾ Max ⁽⁷⁾	Motor Circuit Protector ⁽⁸⁾ Max.
		ND	HD		Min. ⁽³⁾	Max. ⁽⁴⁾	Min. ⁽³⁾	Max. ⁽⁴⁾			
20xE261	10	250	—	252	325	575	325	775	170M5813	700	350
		—	200	201	275	450	275	600	170M5813	600	300
20xE325	10	350	—	314	400	725	400	950	170M5813	900	450
		—	250	252	325	575	325	775	170M5813	750	400
20xE385	10	400	—	372	475	850	475	1100	170M5813	1100	500
		—	350	314	400	725	400	950	170M5813	900	450
20xE416	10	450	—	402	525	900	525	1200	170M5813	1200	550
		—	350	314	400	725	400	950	170M5813	900	450
20xE460	11	500	—	444	575 (1 per phs) 300 (2 per phs)	1000	575 (1 per phs) 300 (2 per phs)	1300	170M8547	1300	600
		—	400	372	475 (1 per phs) 250 (2 per phs)	850	475 (1 per phs) 250 (2 per phs)	1100	170M8547	1100	500
20xE502	11	500	—	485	625 (1 per phs) 325 (2 per phs)	1100	625 (1 per phs) 325 (2 per phs)	1500	170M8547	1500	650
		—	500	444	575 (1 per phs) 300 (2 per phs)	1000	575 (1 per phs) 300 (2 per phs)	1300	170M8547	1300	600
20xE590	11	600	—	570	725 (1 per phs) 375 (2 per phs)	1300	725 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
		—	500	485	625 (1 per phs) 325 (2 per phs)	1100	625 (1 per phs) 325 (2 per phs)	1500	170M5813	1500	700
20xE650	12	700	—	628	800 (1 per phs) 400 (2 per phs)	1400	800 (1 per phs) 400 (2 per phs)	1900	170M5813	1900	900
		—	650	570	725 (1 per phs) 375 (2 per phs)	1300	725 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
20xE750	12	800	—	724	950 (1 per phs) 475 (2 per phs)	1600	950 (1 per phs) 475 (2 per phs)	2200	170M5813	2200	1000
		—	700	628	800 (1 per phs) 400 (2 per phs)	1400	800 (1 per phs) 400 (2 per phs)	1900	170M5813	1900	900
20xE820 ⁽¹⁾	12	900	—	792	1000 (1 per phs) 500 (2 per phs)	1800	1000 (1 per phs) 500 (2 per phs)	2400	170M5813	2400	1100
		—	700	628	800 (1 per phs) 400 (2 per phs)	1400	800 (1 per phs) 400 (2 per phs)	1900	170M5813	1900	900
20xE920	13	1000	—	888	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M6466 ⁽⁵⁾	2700	1200
		—	900	792	1000 (1 per phs) 500 (2 per phs)	1800	1000 (1 per phs) 500 (2 per phs)	2400	170M6466 ⁽⁵⁾	2400	1100
20xE1K0	13	1100	—	994	1300 (1 per phs) 650 (2 per phs)	2300	1300 (1 per phs) 650 (2 per phs)	3000	170M6466 ⁽⁵⁾	3000	1300
		—	1000	888	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M6466 ⁽⁵⁾	2700	1200
20xE1K1	13	1300	—	1139	1500 (1 per phs) 750 (2 per phs)	2600	1500 (1 per phs) 750 (2 per phs)	3500	170M6466 ⁽⁵⁾	3500	1500
		—	1100	994	1300 (1 per phs) 650 (2 per phs)	2200	1300 (1 per phs) 650 (2 per phs)	3000	170M6466 ⁽⁵⁾	3000	1300
20xE1K5	14	1000	—	1448	1900 (1 per phs) 650 (3 per phs)	3300	1900 (1 per phs) 650 (3 per phs)	4500	170M6466	4500	1900
		—	900	1255	1600 (1 per phs) 550 (3 per phs)	2900	1600 (1 per phs) 550 (3 per phs)	3900	170M6466	3900	1700
20xE1K9 ⁽²⁾	14	1100	—	1834	2300 (1 per phs) 800 (3 per phs)	4200	2300 (1 per phs) 800 (3 per phs)	5700	170M6466	5700	2400
		—	1000	1448	1900 (1 per phs) 650 (3 per phs)	3200	1900 (1 per phs) 650 (3 per phs)	4500	170M6466	4500	1900
20xE2K2 ⁽²⁾	14	1200	—	2172	2800 (1 per phs) 950 (3 per phs)	5000	2800 (1 per phs) 950 (3 per phs)	6700	170M6466	6700	2900
		—	1100	1834	2300 (1 per phs) 800 (3 per phs)	4200	2300 (1 per phs) 800 (3 per phs)	5700	170M6466	5700	2400

(1) 20DE820 drives (ND) are only capable of producing 95% of starting torque under 10 Hz.

(2) Not available with 700S Control.

(3) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.

(4) Maximum protection device size is the highest rated device that supplies drive protection.

(5) These fuses and disconnect are supplied with AC input NEMA/UL Type 1 drives.

(6) Inverse time breaker. Ratings shown are maximum.

(7) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.

(8) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC minimum size is 125% of motor/drive FLA. Ratings shown are suggested. Instantaneous trip settings must be set to US NEC code. Not to exceed 1300% FLA.

Table 15 - 690V AC Input Protection Devices

Drive Catalog Number	Frame	kW Rating		Input Ratings	Dual Element Time Delay Fuse		Non-Time Delay Fuse		Bussmann Style Semi-Conductor Fuse	Circuit Breaker ⁽⁶⁾	Motor Circuit Protector ⁽⁸⁾
		ND	HD	Amps	Min. ⁽³⁾	Max. ⁽⁴⁾	Min. ⁽³⁾	Max. ⁽⁴⁾		Max. ⁽⁷⁾	Max.
20xF261	10	250	—	263	350	575	350	775	170M5813	750	350
		—	200	210	275	450	275	600	170M5813	600	300
20xF325	10	315	—	327	425	725	425	950	170M5813	900	450
		—	250	263	350	575	350	775	170M5813	750	400
20xF385	10	355	—	388	500	850	500	1100	170M5813	1100	500
		—	315	327	425	725	425	950	170M5813	900	450
20xF416	10	400	—	419	525	900	525	1200	170M5813	1200	550
		—	315	327	425	700	425	950	170M5813	900	450
20xF460	11	500	—	463	600 (1 per phs) 300 (2 per phs)	1000	600 (1 per phs) 300 (2 per phs)	1300	170M8547	1300	600
		—	400	388	500 (1 per phs) 250 (2 per phs)	850	500 (1 per phs) 250 (2 per phs)	1100	170M8547	1100	500
20xF502	11	560	—	506	650 (1 per phs) 325 (2 per phs)	1100	650 (1 per phs) 325 (2 per phs)	1500	170M8547	1500	650
		—	500	463	600 (1 per phs) 300 (2 per phs)	1000	600 (1 per phs) 300 (2 per phs)	1300	170M8547	1300	600
20xF590	11	580	—	594	750 (1 per phs) 375 (2 per phs)	1300	750 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
		—	500	506	650 (1 per phs) 325 (2 per phs)	1100	650 (1 per phs) 325 (2 per phs)	1500	170M5813	1500	700
20xF650	12	630	—	655	850 (1 per phs) 425 (2 per phs)	1400	850 (1 per phs) 425 (2 per phs)	1900	170M5813	1900	900
		—	560	594	750 (1 per phs) 375 (2 per phs)	1300	750 (1 per phs) 375 (2 per phs)	1700	170M5813	1700	800
20xF750	12	710	—	756	950 (1 per phs) 475 (2 per phs)	1600	950 (1 per phs) 475 (2 per phs)	2200	170M5813	2200	1000
		—	630	655	850 (1 per phs) 425 (2 per phs)	1400	850 (1 per phs) 425 (2 per phs)	1900	170M5813	1900	900
20xF820 ⁽¹⁾	12	800	—	826	1100 (1 per phs) 550 (2 per phs)	1800	1100 (1 per phs) 550 (2 per phs)	2400	170M5813	2400	1100
		—	630	655	850 (1 per phs) 425 (2 per phs)	1400	850 (1 per phs) 425 (2 per phs)	1900	170M5813	1900	900
20xF920	13	900	—	927	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M6466 ⁽⁵⁾	2700	1200
		—	800	826	1100 (1 per phs) 550 (2 per phs)	1800	1100 (1 per phs) 550 (2 per phs)	2400	170M6466 ⁽⁵⁾	2400	1100
20xF1K0	13	1000	—	1038	1300 (1 per phs) 650 (2 per phs)	2300	1300 (1 per phs) 650 (2 per phs)	3000	170M6466 ⁽⁵⁾	3000	1300
		—	900	927	1200 (1 per phs) 600 (2 per phs)	2000	1200 (1 per phs) 600 (2 per phs)	2700	170M6466 ⁽⁵⁾	2700	1200
20xF1K1	13	1100	—	1189	1500 (1 per phs) 750 (2 per phs)	2600	1500 (1 per phs) 750 (2 per phs)	3500	170M6466 ⁽⁵⁾	3500	1500
		—	1000	1038	1300 (1 per phs) 650 (2 per phs)	2300	1300 (1 per phs) 650 (2 per phs)	3000	170M6466 ⁽⁵⁾	3000	1300
20xF1K5	14	1500	—	1511	1900 (1 per phs) 650 (3 per phs)	3300	1900 (1 per phs) 650 (3 per phs)	4500	170M6466	4500	1900
		—	1300	1310	1700 (1 per phs) 575 (3 per phs)	2900	1700 (1 per phs) 575 (3 per phs)	3900	170M6466	3900	1700
20xF1K9 ⁽²⁾	14	1800	—	1914	2400 (1 per phs) 800 (3 per phs)	4200	2400 (1 per phs) 800 (3 per phs)	5700	170M6466	5700	2400
		—	1500	1511	1900 (1 per phs) 650 (3 per phs)	3200	1900 (1 per phs) 650 (3 per phs)	4500	170M6466	4500	1900
20xF2K2 ⁽²⁾	14	2000	—	2267	2900 (1 per phs) 950 (3 per phs)	5000	2900 (1 per phs) 950 (3 per phs)	6700	170M6466	6700	2900
		—	1800	1914	2400 (1 per phs) 800 (3 per phs)	4200	2400 (1 per phs) 800 (3 per phs)	5700	170M6466	5700	2400

(1) 20DF820 drives (ND) are only capable of producing 95% of starting torque under 10 Hz.

(2) Not available with 700S Control.

(3) Minimum protection device size is the lowest rated device that supplies maximum protection without nuisance tripping.

(4) Maximum protection device size is the highest rated device that supplies drive protection.

(5) These fuses and disconnect are supplied with AC input NEMA/UL Type 1 drives.

(6) Inverse time breaker. Ratings shown are maximum.

(7) Maximum allowable rating by US NEC. Exact size must be chosen for each installation.

(8) Motor Circuit Protector - instantaneous trip circuit breaker. For US NEC minimum size is 125% of motor/drive FLA. Ratings shown are suggested. Instantaneous trip settings must be set to US NEC code. Not to exceed 1300% FLA.

Table 16 - 540V DC Input Protection Devices

Drive Catalog Number	Frame	kW Rating		DC Input Ratings	Fuse	Bussmann Style Fuse
		ND	HD	Amps		
20xH385	10	200	-	453	700	170M6611
		-	160	353	700	170M6611
20xH460	10	250	-	541	900	170M6613
		-	200	453	900	170M6613
20xH500	10	250	-	589	500 (2 per phs)	170M6608
		-	250	494	500 (2 per phs)	170M6608
20xH590	11	315	-	695	550 (2 per phs)	170M6609
		-	250	612	550 (2 per phs)	170M6609
20xH650	11	355	-	765	630 (2 per phs)	170M6610
		-	315	695	630 (2 per phs)	170M6610
20xH730	11	400	-	859	700 (2 per phs)	170M6611
		-	355	765	700 (2 per phs)	170M6611
20xH820	12	450	-	965	700 (2 per phs)	170M6611
		-	400	859	700 (2 per phs)	170M6611
20xH920	12	500	-	1083	550 (3 per phs)	170M6609
		-	450	965	550 (3 per phs)	170M6609
20xH1K0	12	560	-	1213	630 (3 per phs)	170M6610
		-	500	1083	630 (3 per phs)	170M6610
20xH1K1	13	630	-	1354	2400	170M7107
		-	560	1213	2400	170M7107
20xH1K3	13	710	-	1530	2400	170M7107
		-	630	1354	2400	170M7107
20xH1K4	13	800	-	1707	2400	170M7107
		-	710	1413	2400	170M7107
20xH1K7 ⁽¹⁾	14	1000	-	2084	—	170M8610
		-	900	1883	—	170M8610
20xH2K1 ⁽¹⁾	14	1200	-	2531	—	170M8610
		-	1100	2284	—	170M8610
20xH2K7 ⁽¹⁾	14	1600	-	3178	—	170M8610
		-	1300	2708	—	170M8610

(1) Not available with 700S Control.

Table 17 - 650V DC Input Protection Devices

Drive Catalog Number	Frame	HP Rating		DC Input Ratings	Fuse	Bussmann Style Fuse
		ND	HD	Amps		
20xJ385	10	300	-	434	700	170M6611
		-	250	338	700	170M6611
20xJ460	10	350	-	519	900	170M6613
		-	300	434	900	170M6613
20xJ500	10	450	-	564	500 (2 per phs)	170M6608
		-	350	474	500 (2 per phs)	170M6608
20xJ590	11	500	-	666	550 (2 per phs)	170M6609
		-	450	587	550 (2 per phs)	170M6609
20xJ650	11	500	-	733	630 (2 per phs)	170M6610
		-	500	666	630 (2 per phs)	170M6610
20xJ730	11	600	-	824	700 (2 per phs)	170M6611
		-	500	733	700 (2 per phs)	170M6611
20xJ820	12	700	-	925	700 (2 per phs)	170M6611
		-	600	824	700 (2 per phs)	170M6611
20xJ920	12	800	-	1038	550 (3 per phs)	170M6609
		-	700	925	550 (3 per phs)	170M6609
20xJ1K0	12	900	-	1162	630 (3 per phs)	170M6610
		-	800	1038	630 (3 per phs)	170M6610

Drive Catalog Number	Frame	HP Rating		DC Input Ratings Amps	Fuse	Bussmann Style Fuse
		ND	HD			
20xJ1K1	13	1000	-	1297	2400	170M7107
		-	900	1162	2400	170M7107
20xJ1K3	13	1200	-	1467	2400	170M7107
		-	1000	1297	2400	170M7107
20xJ1K4	13	1250	-	1636	2400	170M7107
		-	1000	1354	2400	170M7107
20xJ1K7 ⁽¹⁾	14	1500	-	1997	-	170M8610
		-	1400	1805	-	170M8610
20xJ2K1 ⁽¹⁾	14	1900	-	2425	-	170M8610
		-	1700	2189	-	170M8610
20xJ2K7 ⁽¹⁾	14	2300	-	3046	-	170M8610
		-	2000	2595	-	170M8610

(1) Not available with 700S Control.

Table 18 - 810V DC Input Protection Devices

Drive Catalog Number	Frame	HP Rating		DC Input Ratings Amps	Fuse	Bussmann Style Fuse
		ND	HD			
20xK261	10	250	-	294	450	170M5609
		-	200	235	450	170M5609
20xK325	10	350	-	367	550	170M6609
		-	250	294	550	170M6609
20xK385	10	400	-	434	700	170M6611
		-	350	367	700	170M6611
20xK416	10	450	-	469	800	170M6612
		-	350	367	800	170M6612
20xK460	11	500	-	519	450 (2 per phs)	170M5609
		-	400	434	450 (2 per phs)	170M5609
20xK502	11	500	-	566	500 (2 per phs)	170M6608
		-	500	519	500 (2 per phs)	170M6608
20xK590	11	600	-	666	500 (2 per phs)	170M6608
		-	500	566	500 (2 per phs)	170M6608
20xK650	12	700	-	733	500 (2 per phs)	170M6608
		-	650	666	500 (2 per phs)	170M6608
20xK750	12	800	-	846	630 (2 per phs)	170M6610
		-	700	733	630 (2 per phs)	170M6610
20xK820 ⁽¹⁾	12	900	-	925	630 (2 per phs)	170M6610
		-	700	733	630 (2 per phs)	170M6610
20xK920	13	1000	-	1038	2400	170M7107
		-	900	925	2400	170M7107
20xK1K0	13	1100	-	1162	2400	170M7107
		-	1000	1038	2400	170M7107
20xK1K1	13	1300	-	1331	2400	170M7107
		-	1100	1162	2400	170M7107
20xK1K5	14	1600	-	1692	-	170M8610
		-	1400	1467	-	170M8610
20xK1K9 ⁽²⁾	14	2000	-	2143	-	170M8610
		-	1600	1692	-	170M8610
20xK2K2 ⁽²⁾	14	2400	-	2538	-	170M8610
		-	2000	2143	-	170M8610

(1) 20DK820 drives (ND) are only capable of producing 95% of starting torque under 10 Hz.

(2) Not available with 700S Control.

Table 19 - 932V DC Input Protection Devices

Drive Catalog Number	Frame	kW Rating		DC Input Ratings	Fuse	Bussmann Style Fuse
		ND	HD	Amps		
20xM261	10	250	—	307	500	170M5744
		—	200	245	500	170M5744
20xM325	10	315	—	383	630	170M5746
		—	250	307	630	170M5746
20xM385	10	355	—	453	700	170M6745
		—	315	383	700	170M6745
20xM416	10	400	—	490	700	170M6745
		—	315	383	700	170M6745
20xM460	11	450	—	542	450 (2 per phs)	170M5743
		—	355	453	450 (2 per phs)	170M5743
20xM502	11	500	—	591	500 (2 per phs)	170M5744
		—	400	542	500 (2 per phs)	170M5744
20xM590	11	560	—	695	500 (2 per phs)	170M5744
		—	500	591	500 (2 per phs)	170M5744
20xM650	12	630	—	765	550 (2 per phs)	170M5745
		—	560	695	550 (2 per phs)	170M5745
20xM750	12	710	—	883	630 (2 per phs)	170M5746
		—	630	765	630 (2 per phs)	170M5746
20xM820 ⁽¹⁾	12	800	—	965	630 (2 per phs)	170M5746
		—	630	765	630 (2 per phs)	170M5746
20xM920	13	900	—	1038	2400	170M7107
		—	800	925	2400	170M7107
20xM1K0	13	1000	—	1162	2400	170M7107
		—	900	1038	2400	170M7107
20xM1K1	13	1100	—	1331	2400	170M7107
		—	1000	1162	2400	170M7107
20xM1K5	14	1500	—	1766	—	170M8610
		—	1300	1530	—	170M8610
20xM1K9 ⁽²⁾	14	1800	—	2237	—	170M8610
		—	1500	1766	—	170M8610
20xM2K2 ⁽²⁾	14	2000	—	2649	—	170M8610
		—	1800	2237	—	170M8610

(1) 20DM820 drives (ND) are only capable of producing 95% of starting torque under 10 Hz.

(2) Not available with 700S Control.

Control Frame Installation

The control frame, which contains the main control and option boards (if ordered) in an enclosure and space for a programming terminal and communications modules, is delivered separate from the power structure and can be installed on a sidewall or the enclosure frame. The control frame has a hinged assembly on the left side allowing it to be installed in front of the power structure (NFE converters in frames 13 and 14) when the enclosure depth allows (see Enclosure Requirements on page 9).

IMPORTANT	In order to avoid interference of the control signals, the control frame must not be installed in front of the AC input and motor output terminals. Refer to Figure 18 on page 33.
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IMPORTANT	The installation location of the control frame must not impede air flow through the drive.
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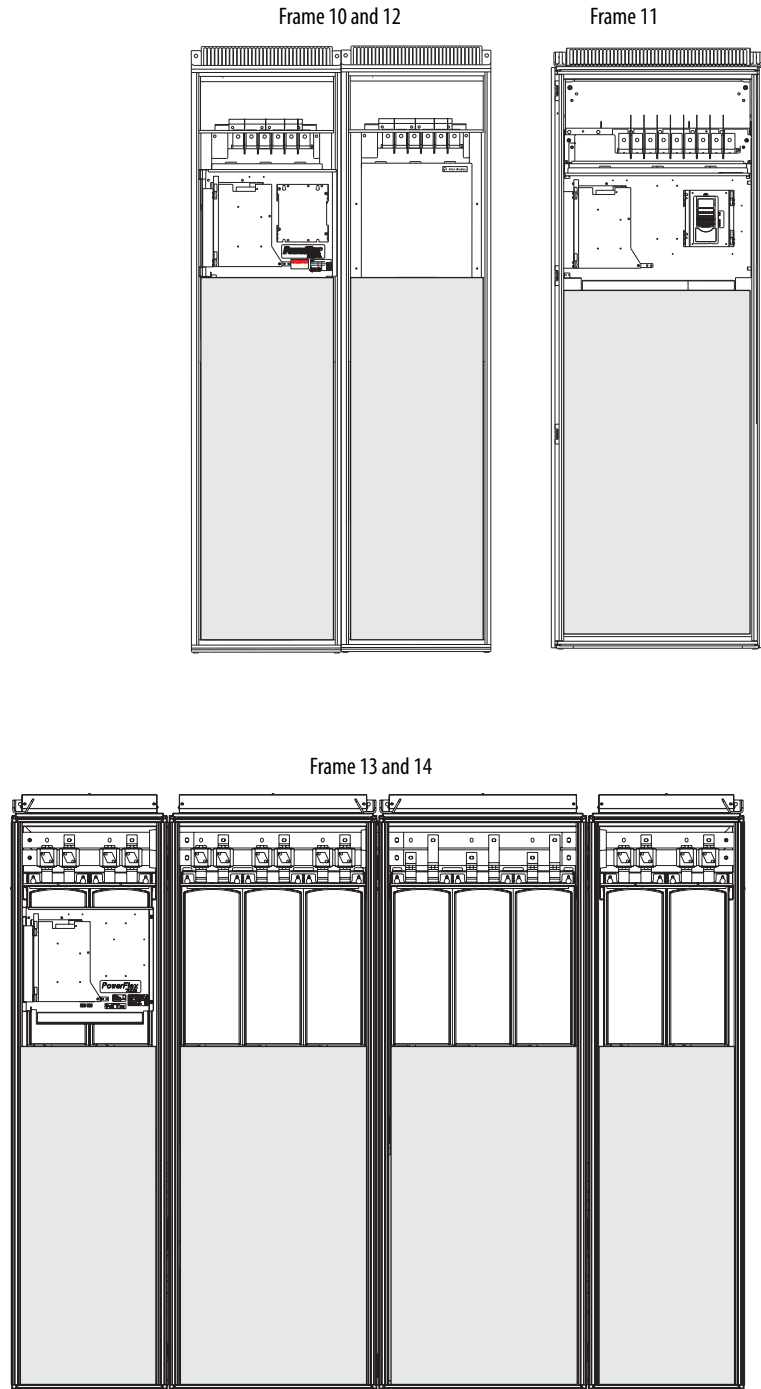
Mounting the Control Frame

Refer to [Figure 49](#) on page 62 and [Figure 50](#) on page 63 for control frame dimensions.

- At the control end (if required), disconnect the 24V connecting cable and the fiber optic cables to the power structure before mounting the control frame.
- Secure the control frame to a sidewall or enclosure frame.
- The standard control cable length is 2.3 m (7.5 ft). Therefore, the control frame must be placed within 2.3 m (7.5 ft) of the power structure.
- To ensure proper grounding of the control frame assembly, attach the braided copper wire supplied on the control frame to the enclosure frame.

Figure 18 - Control Frame Mounting Restrictions

Important: Do Not install control frame in shaded areas shown here when shaded areas contain the AC input and motor output terminals.



PowerFlex 700H Control Connections

Note: For PowerFlex 700S control connections, see PowerFlex 700S Control Connections on page [40](#).

IMPORTANT It may be necessary to disconnect the control connections during drive installation and then re-connect according to the instructions in 700H Control Connections on page [36](#).

The PowerFlex 700H control uses fiber optic connections and 24V DC supplied from the ASIC circuit board, which is located on the power structure. Frame 12 and 14 drives contain two ASIC boards and two ASIC Feedback boards that supply these connections.

Refer to the figures [19](#), [20](#) and [21](#) for the location of the ASIC board(s).

Figure 19 - Frames 10 and 12 ASIC Board Locations

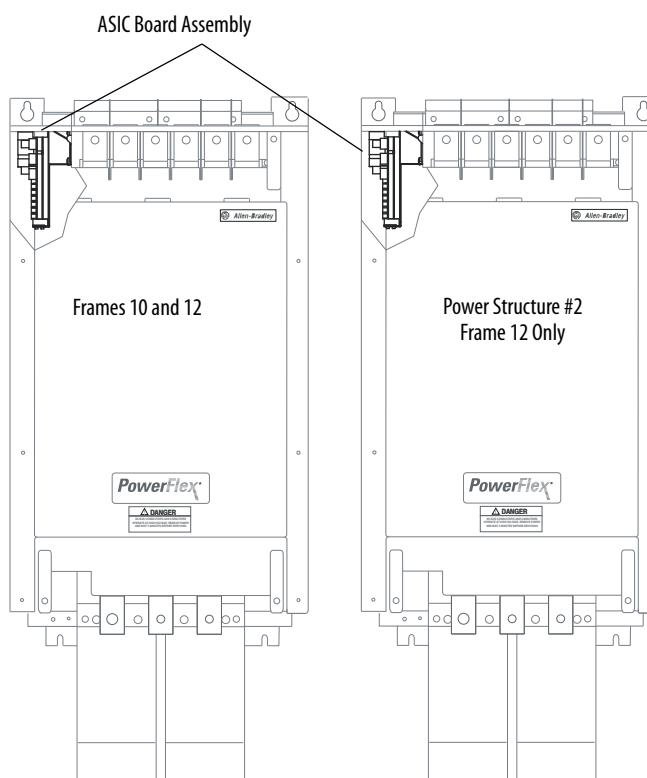


Figure 20 - Frame 11 ASIC Board Location

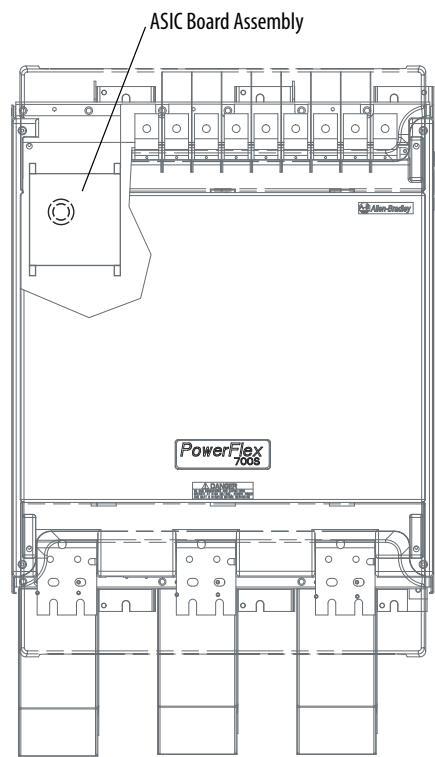
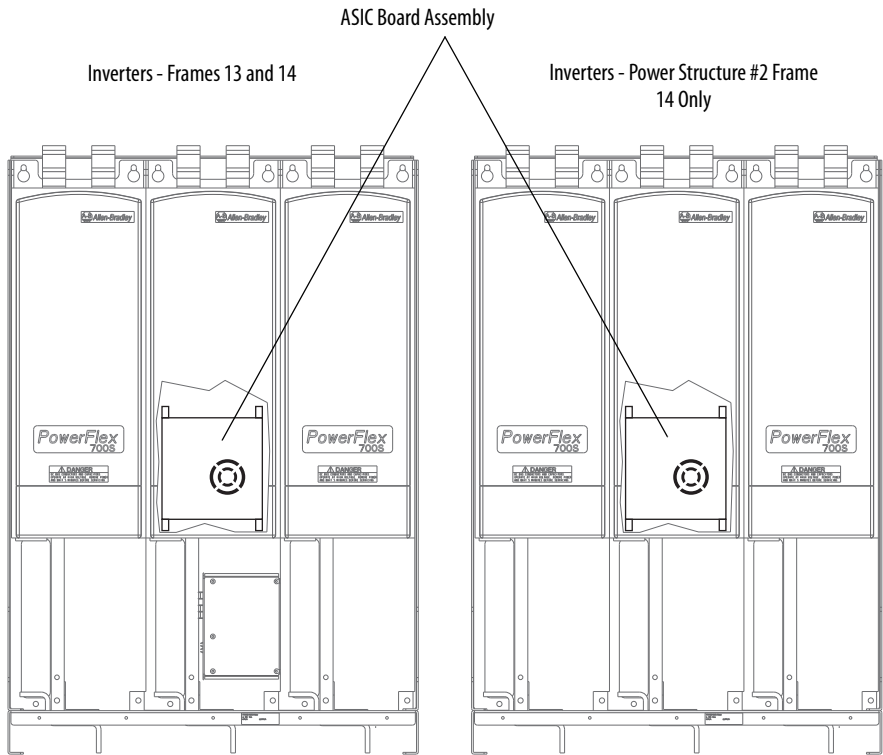
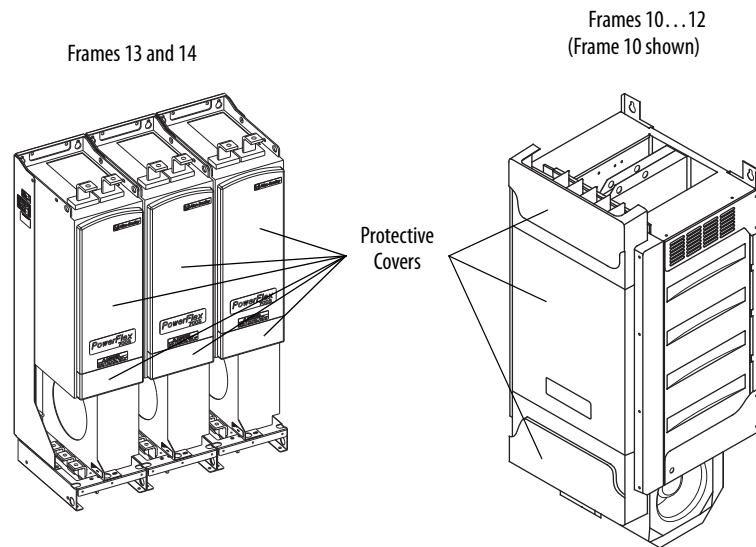


Figure 21 - Frames 13 and 14 ASIC Board Locations



700H Control Connections

1. To access the ASIC board(s), remove the front protective cover(s) from the power structure(s) as shown below.



2. Connect the 24V power supply cable between connector X10 on the ASIC board and connector X2 on the Fiber Optic Adapter or Star Coupler board on the back of the 700H control board. Refer to figures [22](#), [23](#) and [24](#) for connector locations.
3. Connect each fiber optic cable between the respective connectors on the ASIC board(s) and the Fiber Optic Adapter or Star Coupler board. For frames 10, 11 and 13, refer to [Table 20](#) on page [37](#) for cable designations and connection points and figures [22](#) and [23](#) for connector locations. For frames 12 and 14, refer to [Table 21](#) on page [37](#) for cable designations and connection points and figures [22](#) and [24](#) for connector locations.
 - Complete fiber optic cable connections after all electrical wiring has been completed to avoid damage to the cables.
 - Ensure that the fiber optic cables do not contact sharp objects that can cause damage to the cables.
 - The fiber optic cables have a minimum bending radius of 50 mm (2.0 in.).

IMPORTANT	Verify correct cable/connector placement. Connecting the wires incorrectly could damage components.
------------------	---

Table 20 - PowerFlex 700H Fiber Optic Cable Designations - Frames 10, 11 and 13

Connect this Point ...		to this Point ...	
Location	Connector	Location	Connector
ASIC Board	H1	Fiber Optic Adapter Board	H1
	H2		H2
	H3		H3
	H4		H4
	H5		H5
	H6		H6
	H7		H7

Table 21 - PowerFlex 700H Fiber Optic Cable Designations - Frames 12 and 14

Connect this Point ...		to this Point ...	
Location	Connector	Location	Connector
ASIC Board - Power Structure #1	H1	Star Coupler Board	H1
	H2		H2
	H3		H3
	H4		H4
	H5		H5
	H6		H6
	H7		H7
ASIC Feedback Board - Power Structure #1	X900	ASIC Board - Power Structure #1	X26
	H900, H901, H902	Star Coupler Board	H21, H22, H23
	H903	Star Coupler Board	H8
ASIC Board - Power Structure #2	H1	Star Coupler Board	H11
	H2		H12
	H3		H13
	H4		H14
	H5		H15
	H6		H16
	H7		H17
ASIC Feedback Board - Power Structure #2	X900	ASIC Board - Power Structure #2	X26
	H903	Star Coupler Board	H18

Figure 22 - ASIC Board and ASIC Feedback Board Termination Points

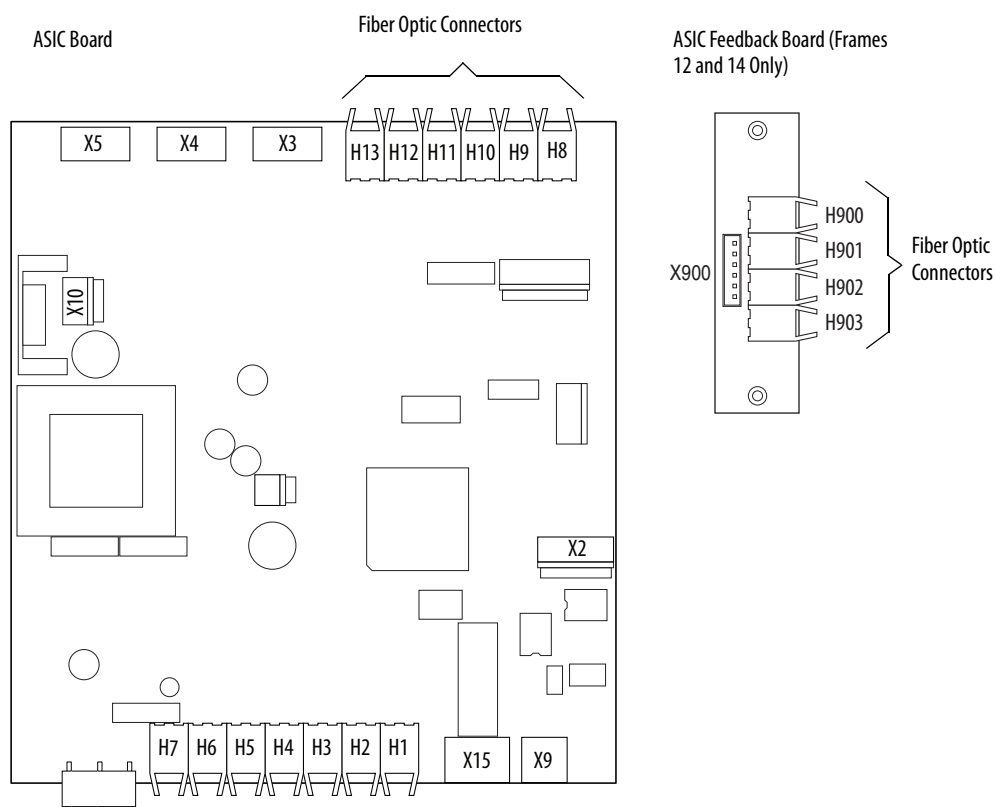


Figure 23 - PowerFlex 700H Fiber Optic Adapter Board Termination Points (Frames 10, 11 and 13)

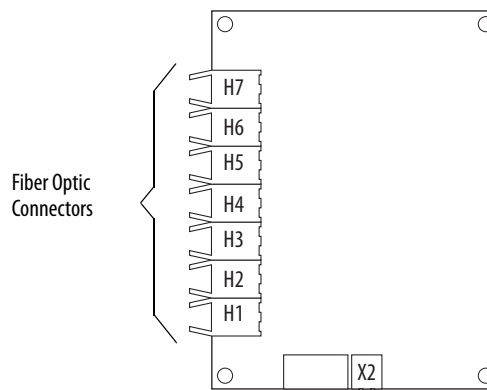
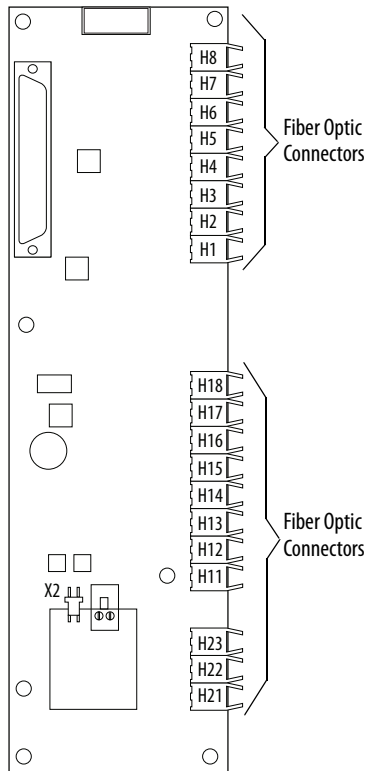


Figure 24 - PowerFlex 700H Star Coupler Board Termination Points (Frames 12 and 14)

4. Secure the cable bundle using cable ties as necessary to guard against cable damage.
5. For Frames 10...12, replace the protective covers on the drive and continue with Output Power Wiring on page [49](#). For Frames 13 and 14, continue with Frames 13 and 14 NFE Converter to Inverter Connections on page [47](#).

PowerFlex 700S Control Connections

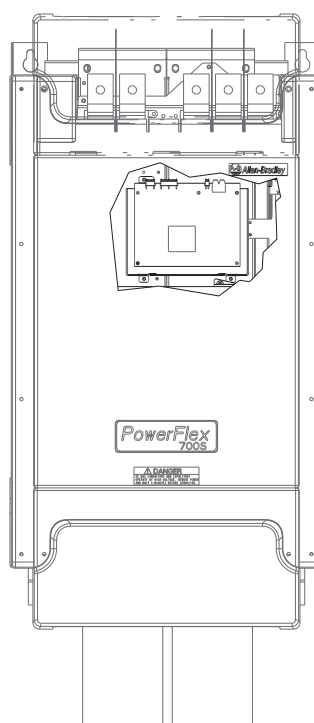
Note: For PowerFlex 700H control connections, see PowerFlex 700H Control Connections on page [34](#).

IMPORTANT It may be necessary to disconnect the control connections during drive installation and then re-connect according to the instructions in 700S Control Connections on page [42](#).

The PowerFlex 700S control uses 24V DC supplied from the Voltage Feedback board and fiber optic connections supplied from the Voltage Feedback and ASIC circuit boards, which are located on the power structure. Frame 12 and 14 drives contain two ASIC boards and two ASIC Feedback boards that supply these connections.

Refer to figures [25](#), [26](#) and [27](#) for the location of the Voltage Feedback board. Refer to the figures [19](#), [20](#) and [21](#) for the location of the ASIC board(s).

Figure 25 - Frames 10 and 12 Voltage Feedback Board Location



Power Structure #1
Frame 12 Only

Figure 26 - Frame 11 Voltage Feedback Board Location

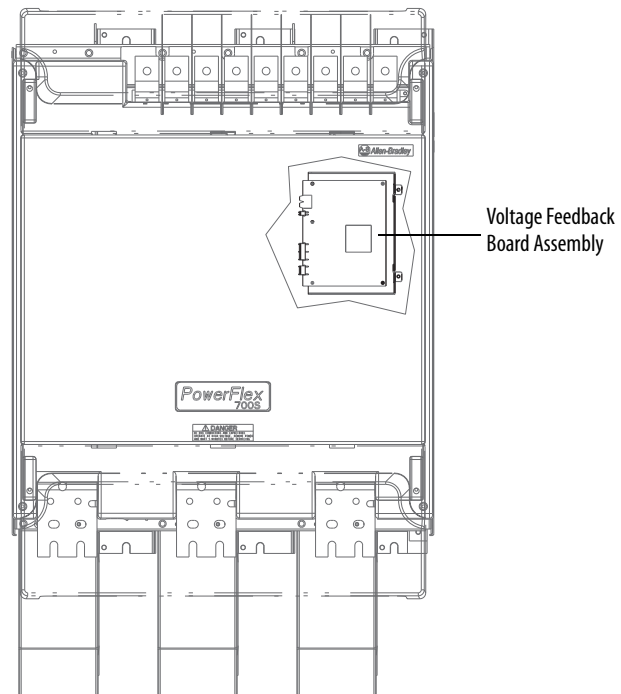
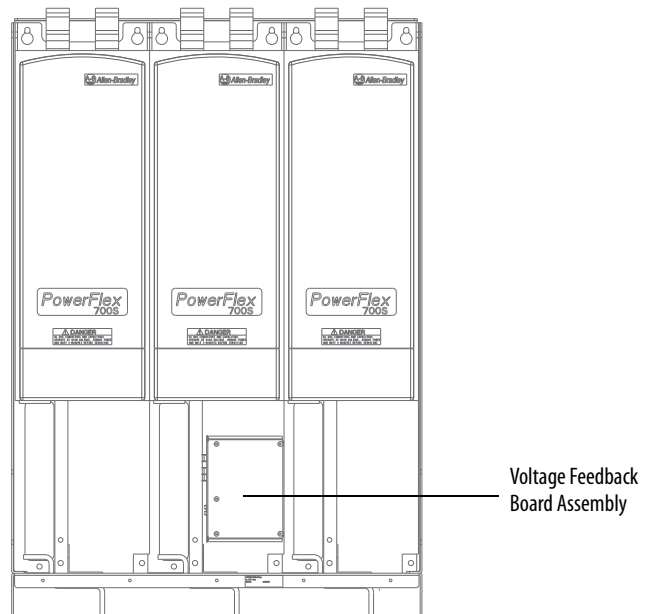


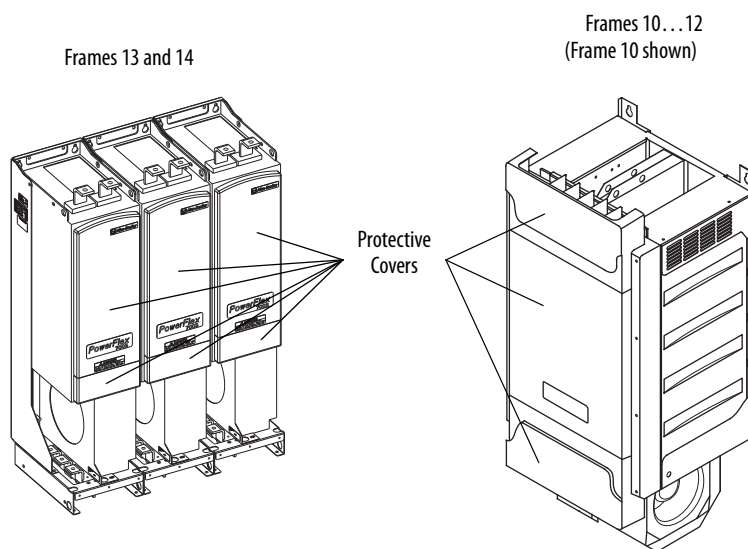
Figure 27 - Frames 13 and 14 Voltage Feedback Board Location

Inverters, Power Structure # 1 -
Frames 13 and 14



700S Control Connections

1. To access the ASIC board(s), remove the front protective cover(s) from the power structure(s) as shown below.



2. Connect the 24V power supply cable and the fiber optic cables between the Voltage Feedback Board and the Common Mode Filter and Fiber Optic Interface or Fiber Optic Star Interface boards. Refer to [Table 22](#) below for cable designations and connection points and figures [28](#), [29](#), [30](#) and [31](#) for connector locations.
 - Complete fiber optic cable connections after all electrical wiring has been completed to avoid damage to the cables.
 - Ensure that the fiber optic cables do not contact sharp objects that can cause damage to the cables.
 - The fiber optic cables have a minimum bending radius of 50 mm (2.0 in.).

IMPORTANT Verify correct cable/connector placement. Connecting the wires incorrectly could damage components.

Table 22 - Voltage Feedback Board Cable Designations

Connect this Point ...		to this Point ...	
Location	Connector	Location	Connector
Voltage Feedback Board	J8	Common Mode Filter Board	J5
	J5	Fiber Optic Interface or Fiber	J7
	J4	Optic Star Interface Board	J6

Figure 28 - PowerFlex 700S Voltage Feedback Board Termination Points

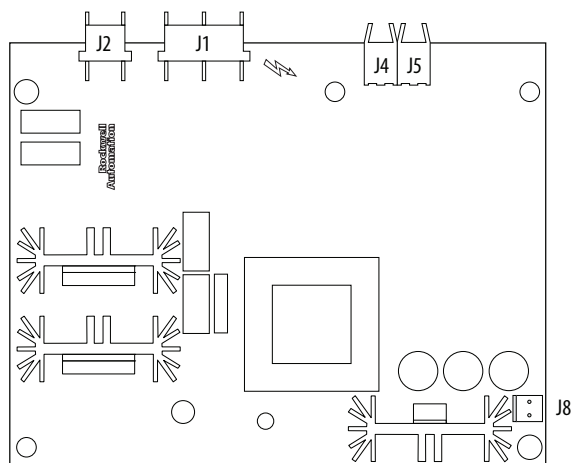


Figure 29 - Common Mode Filter Board Termination Points

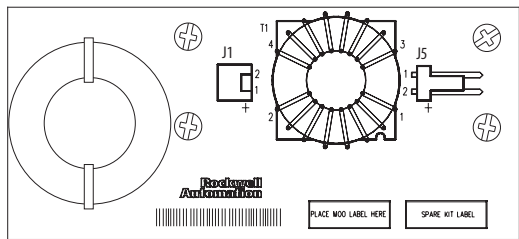


Figure 30 - PowerFlex 700S Fiber Optic Interface Board Termination Points (Frames 10, 11 and 13)

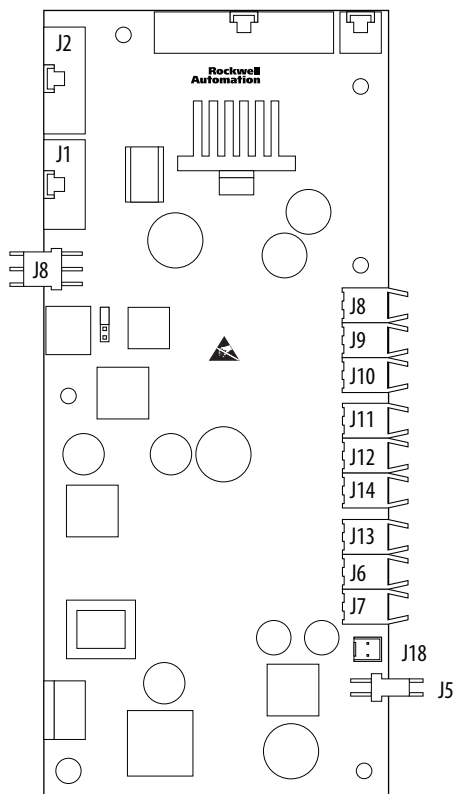
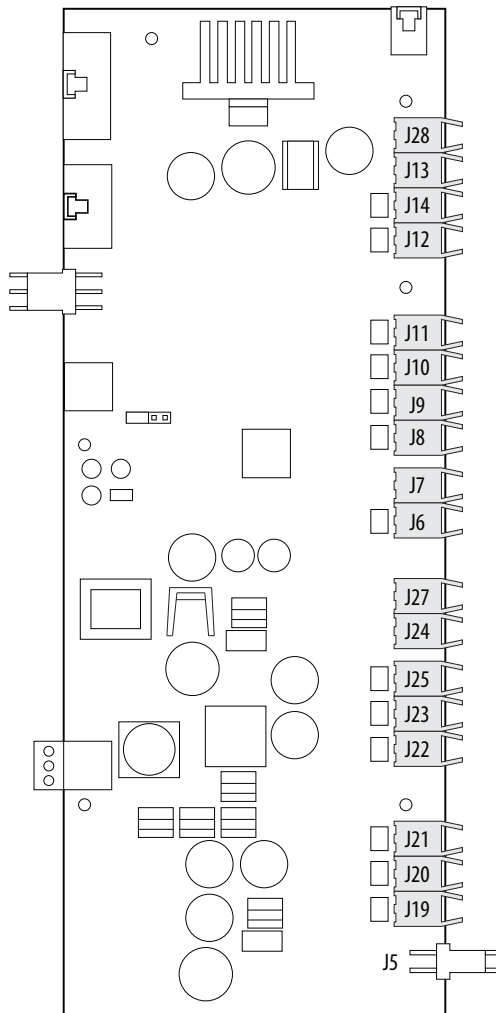


Figure 31 - PowerFlex 700S Fiber Optic Star Interface Board Termination Points (Frames 12 and 14)

3. Connect each fiber optic cable between the respective connectors on the ASIC board(s) and the Fiber Optic Interface or Fiber Optic Star Interface board. For frames 10, 11 and 13, refer to [Table 23](#) on page [45](#) for cable designations and connection points and figures [30](#) and [32](#) for connector locations. For frames 12 and 14, refer to [Table 24](#) on page [45](#) for cable designations and connection points and figures [31](#) and [32](#) for connector locations.

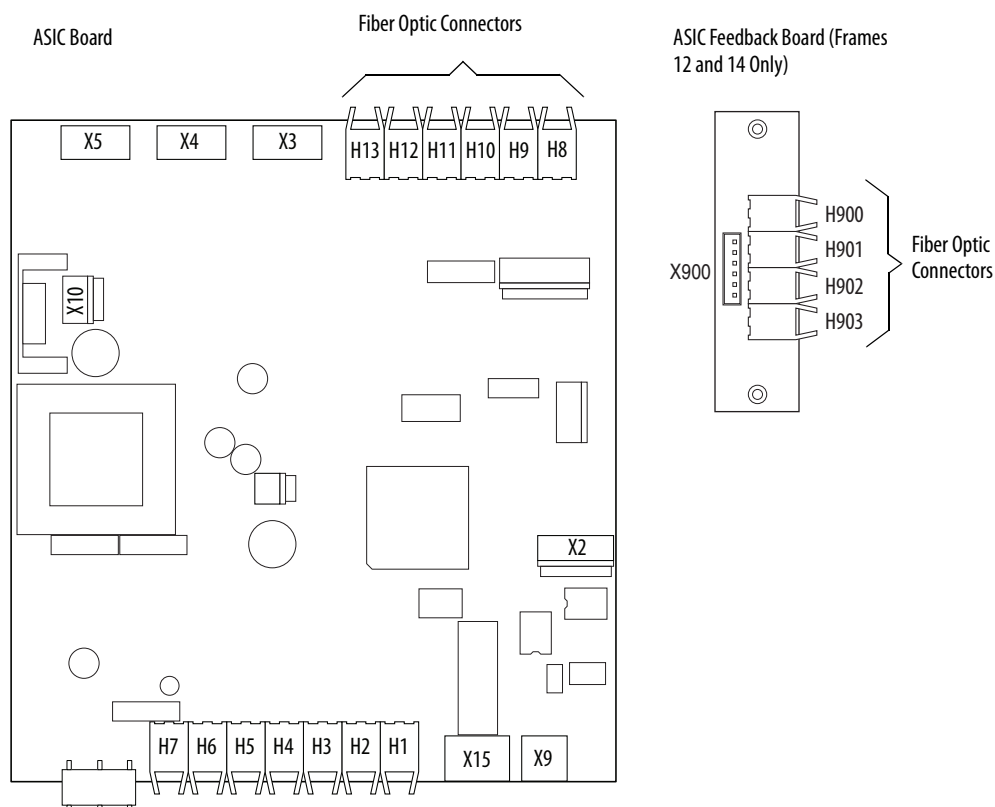
IMPORTANT Verify correct cable/connector placement. Connecting the wires incorrectly could damage components.

Table 23 - PowerFlex 700S Fiber Optic Cable Designations - Frames 10, 11 and 13

Connect this Point ...		to this Point ...	
Location	Connector	Location	Connector
ASIC Board	H1	Fiber Optic Interface Board	J8
	H2		J9
	H3		J10
	H4		J11
	H5		J12
	H6		J14
	H7		J13

Table 24 - PowerFlex 700S Fiber Optic Cable Designations - Frames 12 and 14

Connect this Point ...		to this Point ...	
Location	Connector	Location	Connector
ASIC Board - Power Structure #1	H1	Fiber Optic Star Interface Board	J8
	H2		J9
	H3		J10
	H4		J11
	H5		J12
	H6		J14
	H7		J13
ASIC Board - Power Structure #2	H1	Fiber Optic Star Interface Board	J19
	H2		J20
	H3		J21
	H4		J22
	H5		J23
	H6		J25
	H7		J24
ASIC Feedback Board - Power Structure #1	X900	ASIC Board - Power Structure #1	X26
	H900, H901, H902	Fiber Optic Star Interface Board	H21, H22, H23
	H903	Fiber Optic Star Interface Board	H8
ASIC Feedback Board - Power Structure #2	X900	ASIC Board - Power Structure #2	X26
	H903	Fiber Optic Star Interface Board	H18

Figure 32 - ASIC Board and ASIC Feedback Board Termination Points

4. Secure the cable bundle(s) as necessary to guard against cable damage.
5. For Frames 10...12, replace the protective covers on the drive and continue with Output Power Wiring on page [49](#). For Frames 13 and 14, continue with Frames 13 and 14 NFE Converter to Inverter Connections on page [47](#).

Frames 13 and 14 NFE Converter to Inverter Connections

Frame 13 and 14 drives contain a set of cables used to link the NFE converters and inverter units. Simply insert the cables into the appropriate connectors as shown in figures 33 and 34 below.

IMPORTANT When you have completed these connections, replace the protective covers on the drive.

Figure 33 - Frame 13 NFE Converter to Inverter Connections

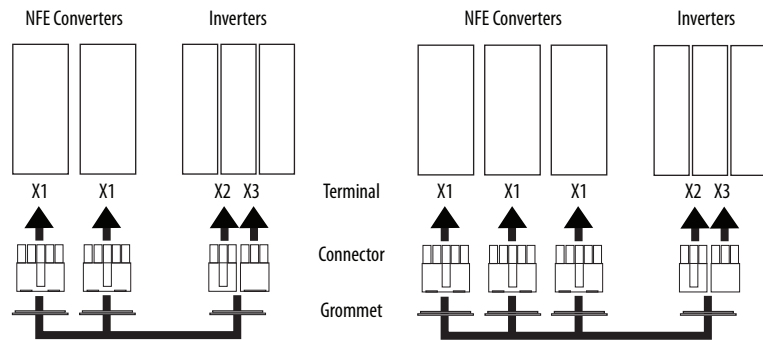
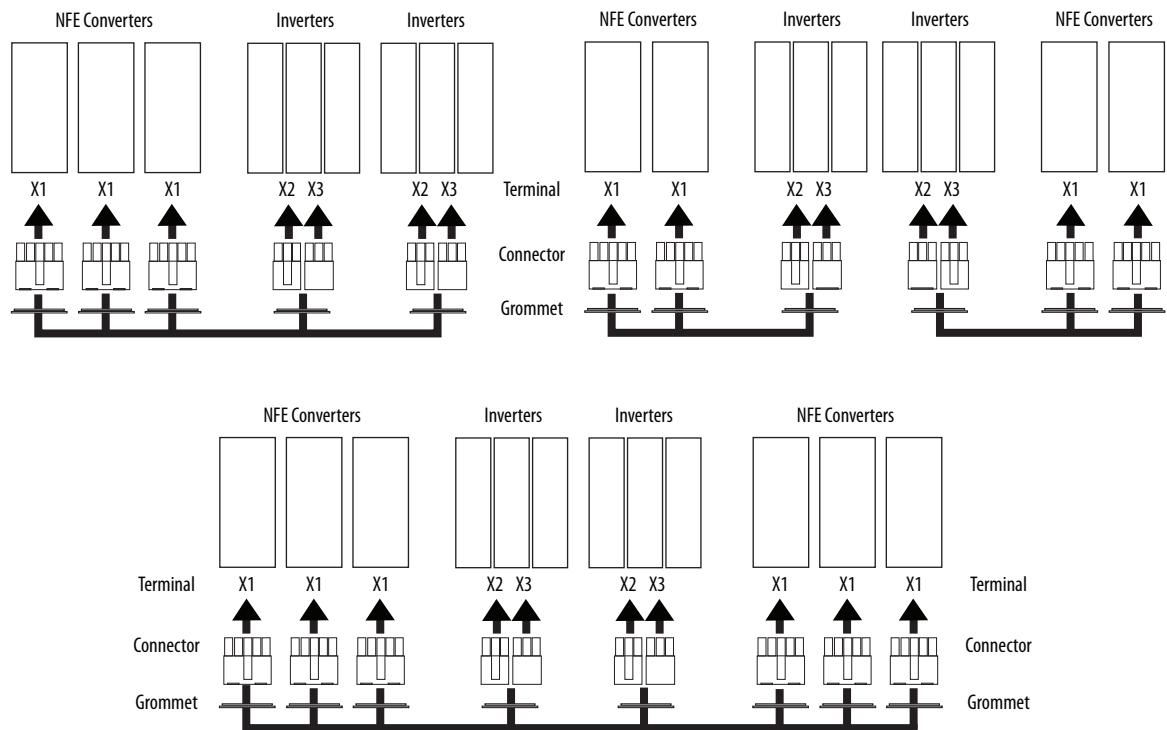


Figure 34 - Frame 14 NFE Converter to Inverter Connections



du/dt Filter Installation

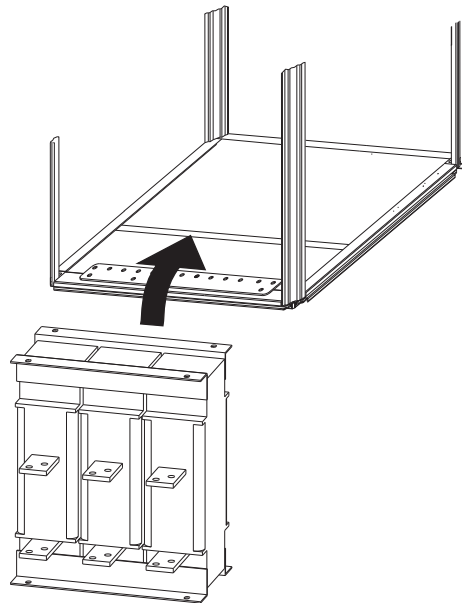
Frame 14 drives can be ordered with or without du/dt filters. The du/dt filter limits the rate of change of output voltage and the rate of change in the IGBT or output transistor switching event.

Refer to the Wiring and Grounding Guidelines for Pulse Width Modulated (PWM) AC Drives, publication [DRIVES-IN001](#), for minimum inductance on installations where du/dt filters are not installed.

The recommended location for the du/dt filters is at the bottom of the same enclosure with the inverters, as close to the rear wall as possible.

Secure the du/dt filters on an assembly plate or by using mounting rails. See [Figure 35](#) below. Refer to Component Dimensions on page [53](#) for more details.

Figure 35 - Recommended du/dt Filter Mounting Location



When cables are used for power wiring, they must be copper and rated at 90° C (194° F). For frame 14 drives, power connections between the output power terminals and the du/dt filters are typically made using busbars, however, copper cables may be used.

IMPORTANT	Busbar alignment should be vertical to allow the maximum flow of cooling air through the enclosure.
------------------	---

Connect power cables between the appropriate output power terminals (U/T1, V/T2, W/T3) and the input terminals of the du/dt filters.

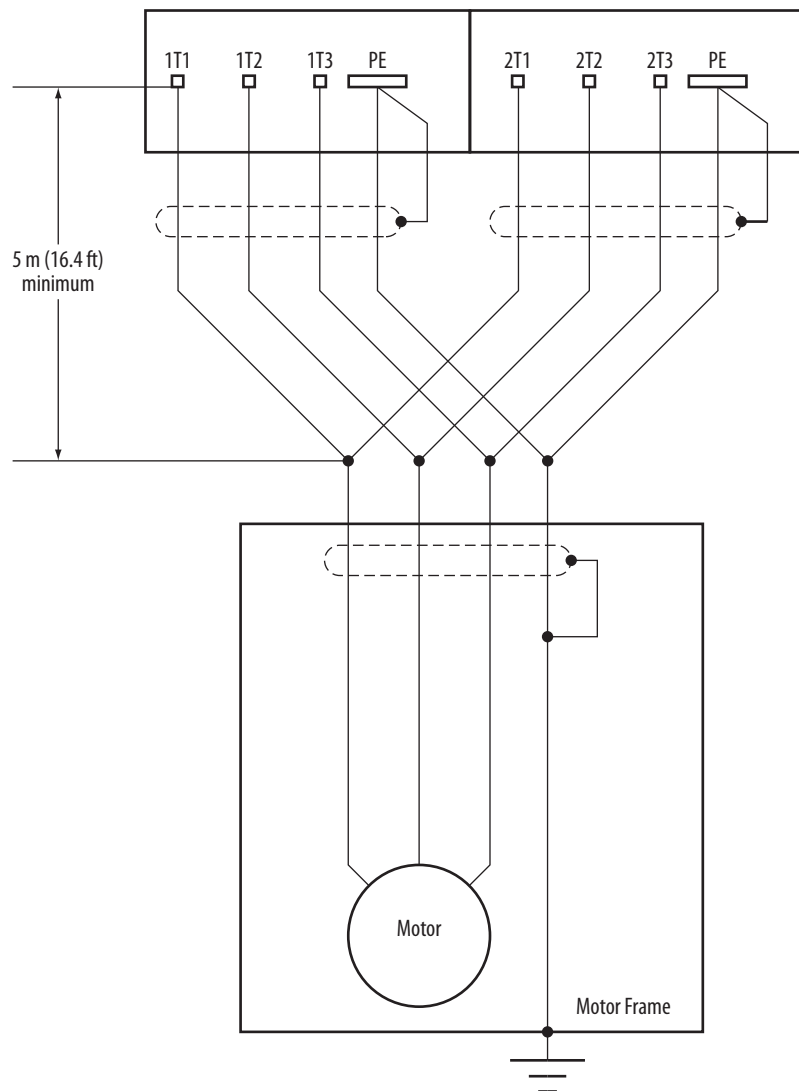
Output Power Wiring

Frame 12 and 14 drives utilize two parallel power structures, and therefore have two sets of output power terminals. You must connect the motor to both sets of output power terminals.

IMPORTANT Parallel wiring must have the same cable dimensions, type and routing. Non-symmetrical wiring may cause unequal loading between the converters and reduce the drive's ability to deliver current to the motor. Refer to [Figure 36](#) below for details.

IMPORTANT The minimum cable length for parallel motor cables from the drive to the point where the cables connect is 5 m (16.4 ft.). Join the parallel cables at the motor end (not the drive end). Or, install a reactor on the output of each power module with a minimum of 5 μ H prior to joining the parallel cables at the motor end. Refer to [Figure 36](#) below for details.

Figure 36 - Frame 12 and 14 Output Power Wiring Example



Output Power Terminal Locations

Refer to the figures below for the location of the output power terminals.

Figure 37 - Frames 10 and 12

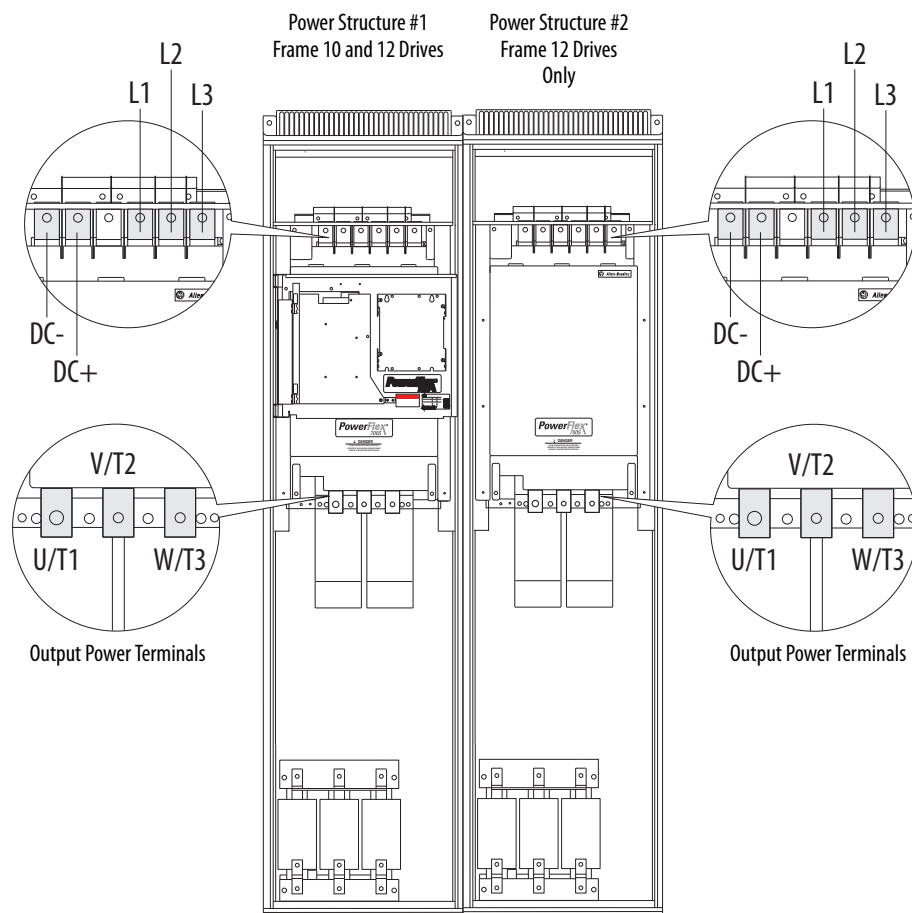


Figure 38 - Frame 11

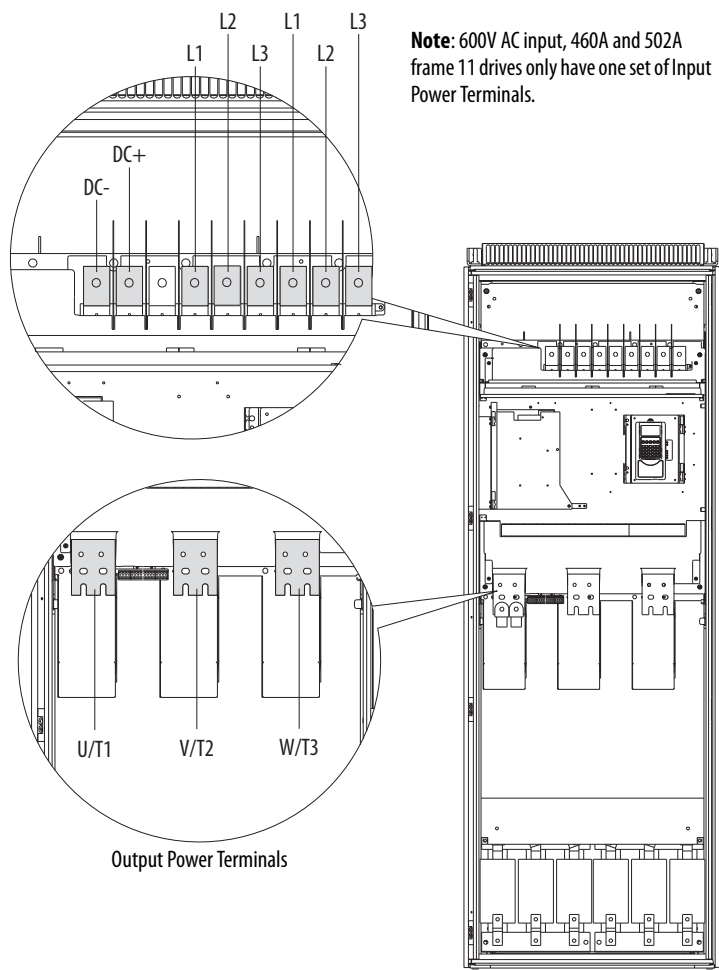
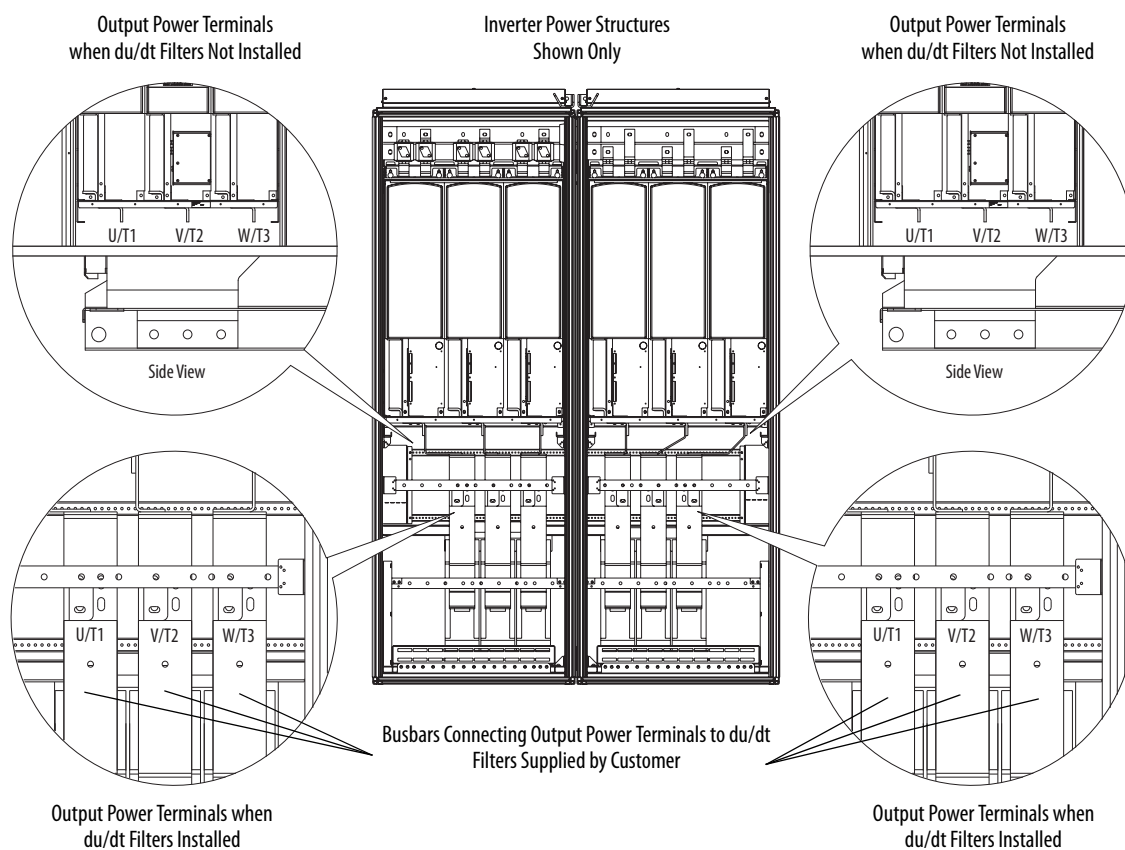


Figure 39 - Frames 13 and 14

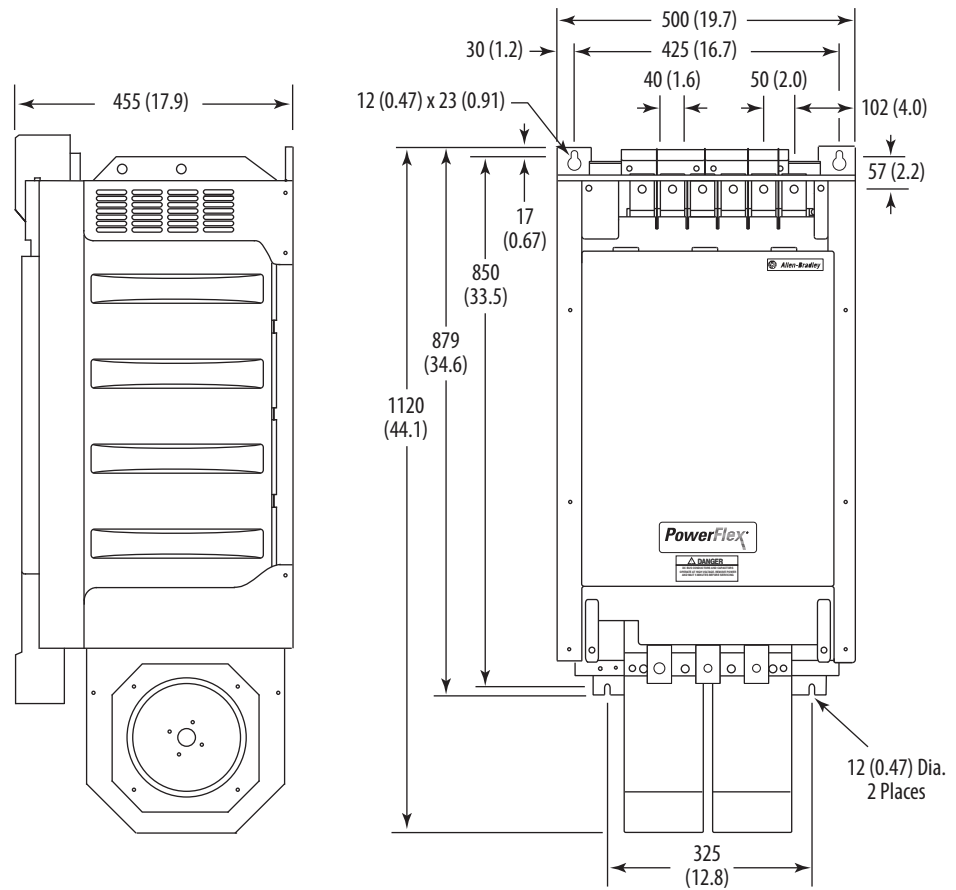


Other Component Installation

For installation of devices such as circuit breakers, fuses, EMC grounding etc. it is recommended that an installation plate be mounted in front of the AC choke. The bottom portion must be left open for air circulation. Fuses must be user supplied.

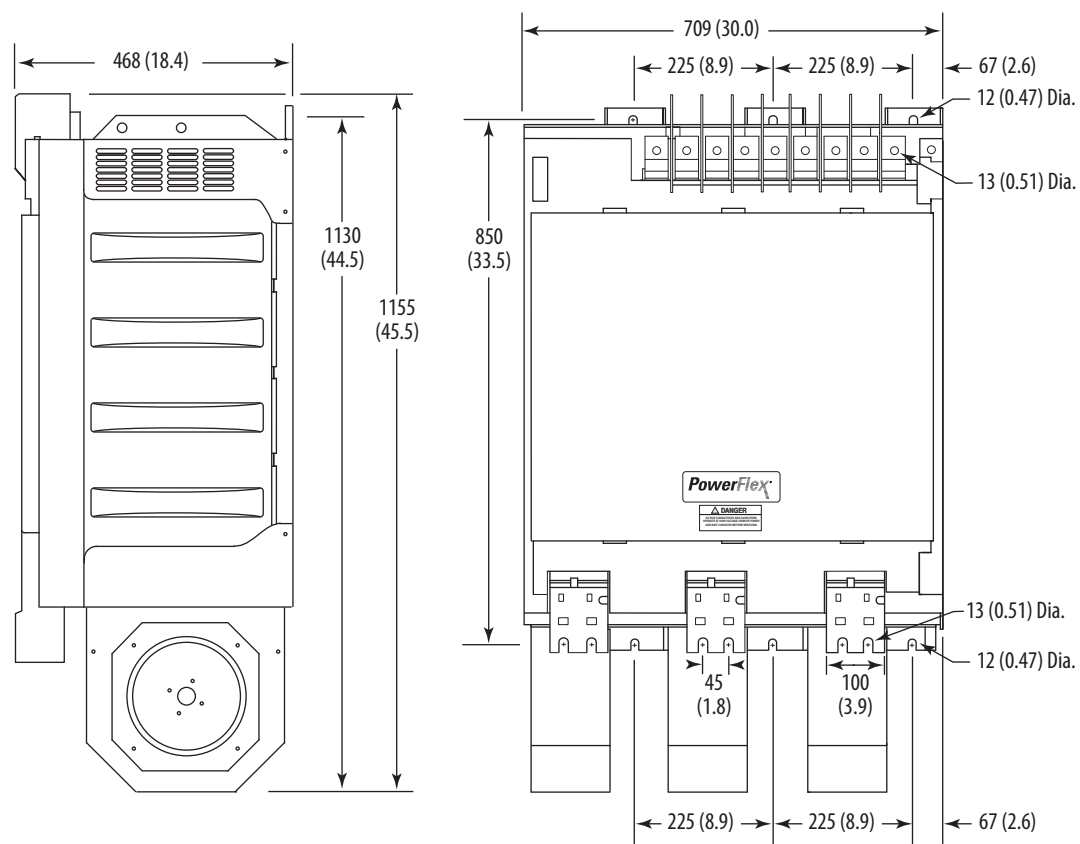
Component Dimensions

Figure 40 - Frame 10 and 12 Power Structures

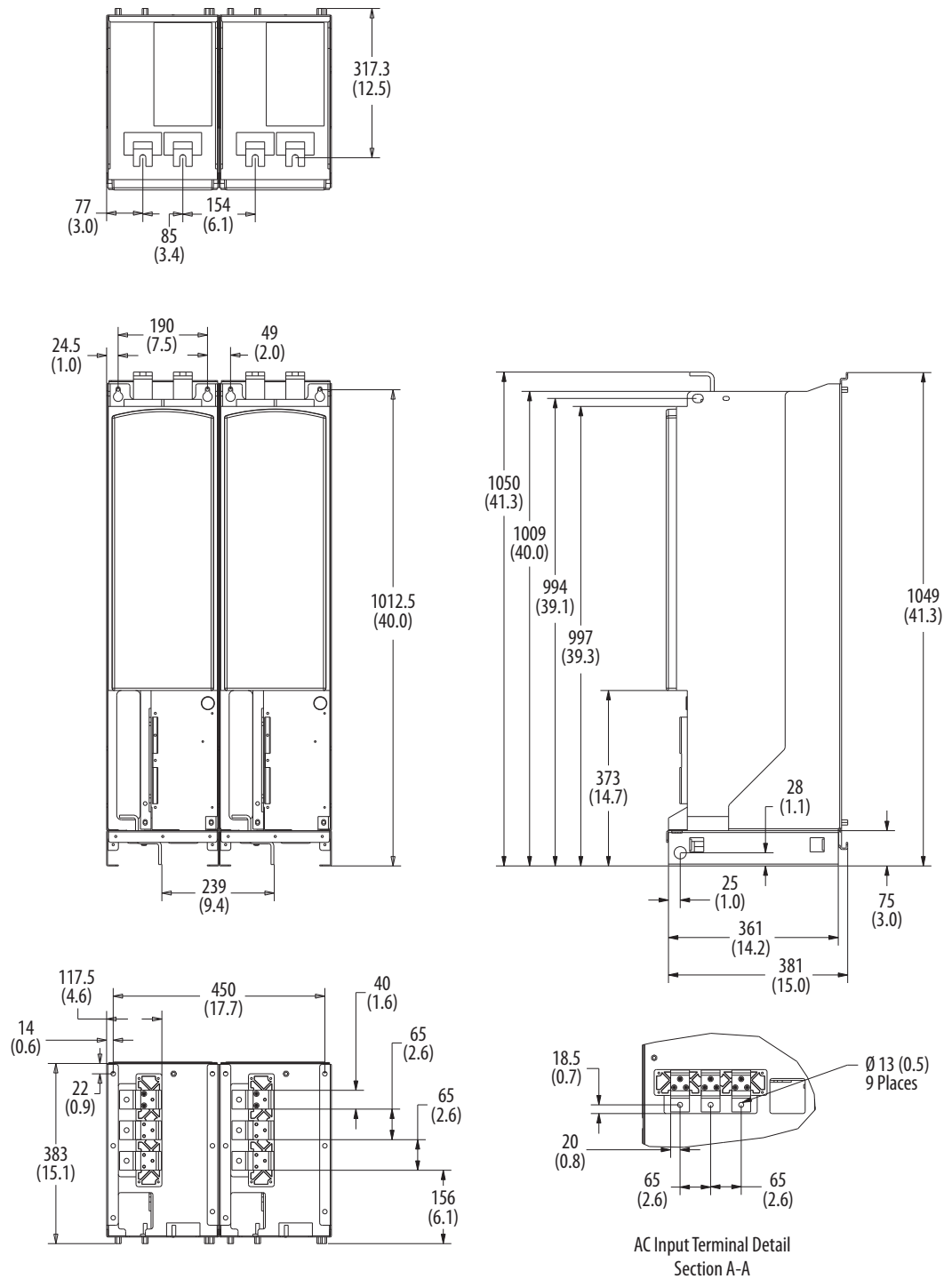


Dimensions are in mm and (in.).

Figure 41 - Frame 11 Power Structure

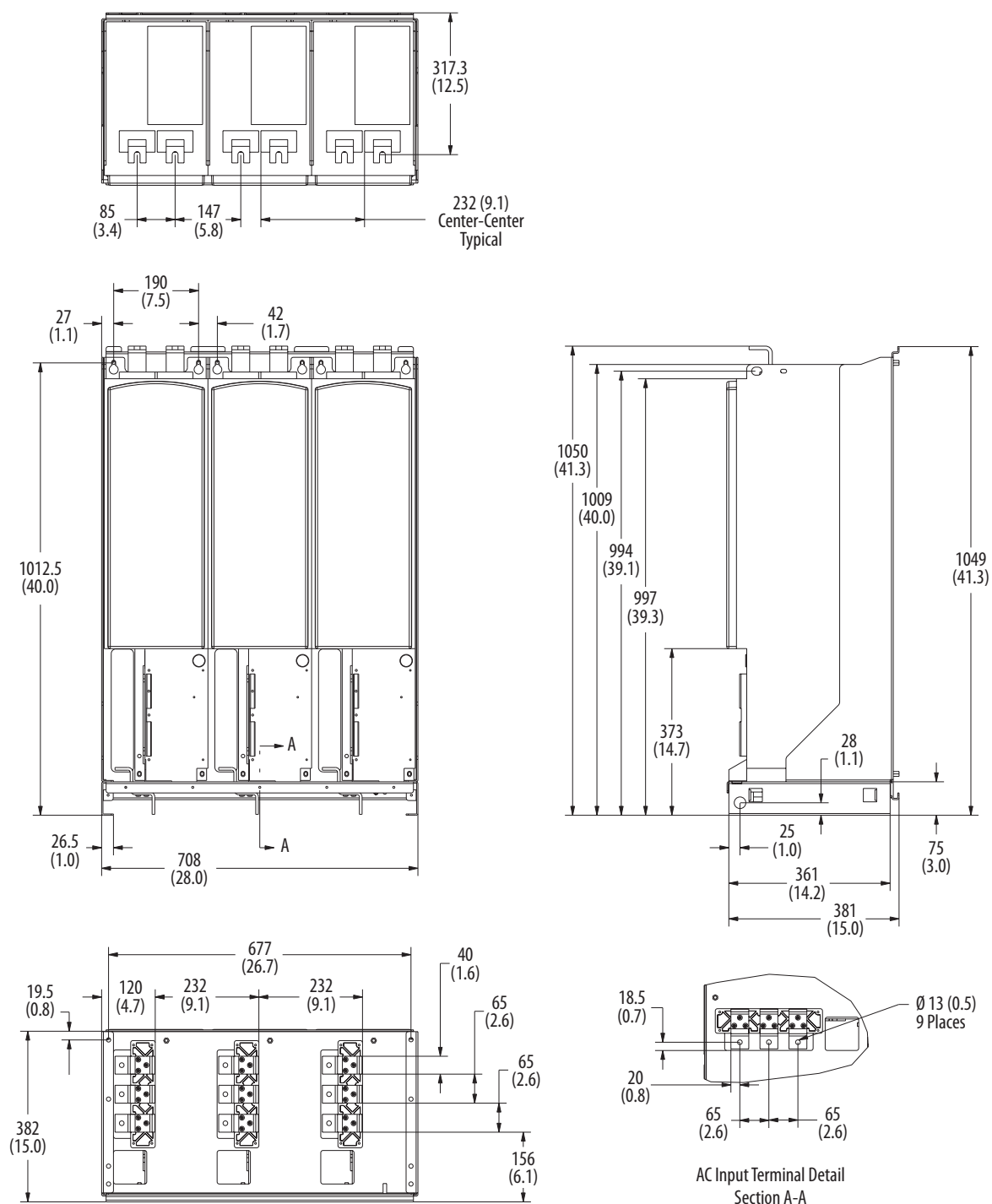


Dimensions are in mm and (in.).

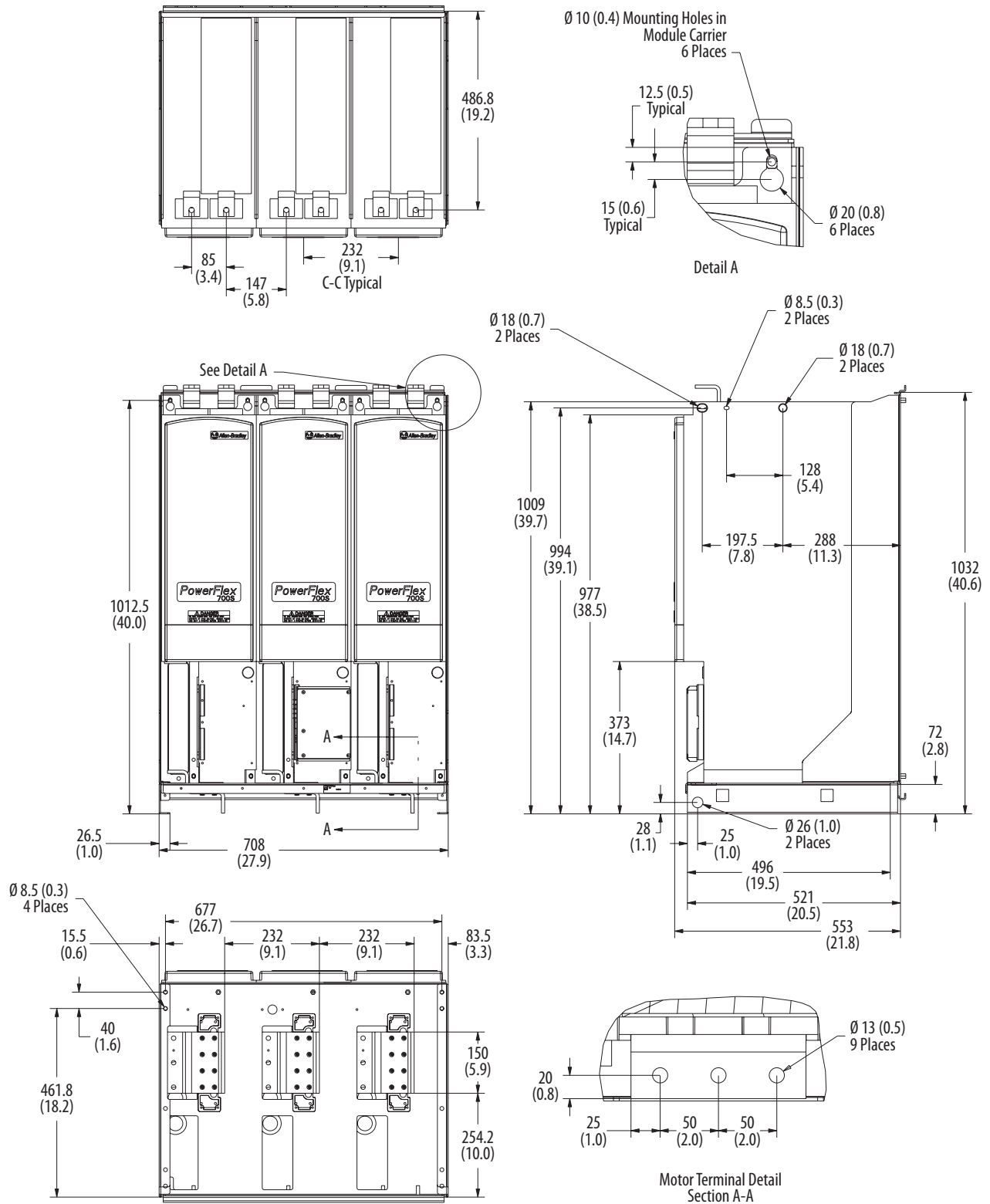
Figure 42 - Two NFE Converters - Frames 13 and 14

Dimensions are in mm and (in.).

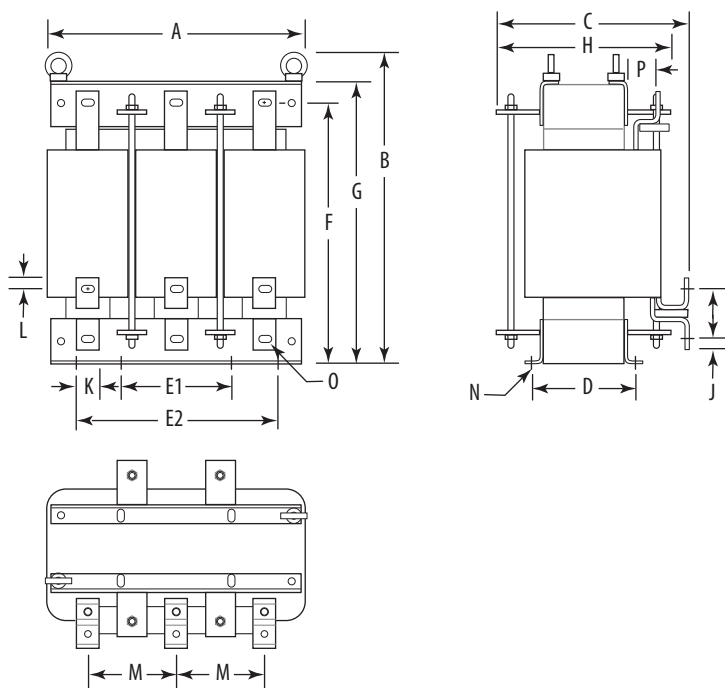
Figure 43 - Three NFE Converters - Frames 13 and 14



Dimensions are in mm and (in.).

Figure 44 - Three Inverters - Frames 13 and 14

Dimensions are in mm and (in.).

Figure 45 - AC Chokes

Choke Catalog Number	Dimensions - mm (in.)																	Weight kg (lb)
	A	B	C	D	E1	E2	F	G	H	I	J	K	L	M	N	O	P	
CHK0261	354 (13.9)	357 (14.1)	230 (9.1)	108 (4.3)	150 (5.9)	275 (10.8)	288 (11.3)	319 (12.6)	206 (8.1)	62 (2.4)	23 (0.9)	30 (1.2)	15 (0.6)	120 (4.7)	9 x 14 (0.4 x 0.6)	9 x 14 (0.4 x 0.6)	39 (1.5)	53 (117)
CHK0400	350 (13.8)	421 (16.6)	262 (10.3)	140 (5.5)	150 (5.9)	275 (10.8)	354 (13.9)	383 (15.1)	238 (9.4)	67 (2.6)	19 (0.7)	30 (1.2)	15 (0.6)	120 (4.7)	9 x 14 (0.4 x 0.6)	11 x 15 (0.4 x 0.6)	39 (1.5)	84 (185)
CHK0520	497 (19.6)	446 (17.6)	244 (9.6)	145 (5.7)	200 (7.9)	—	351 (13.8)	399 (15.7)	204 (8.0)	77 (3.0)	21 (0.8)	40 (1.6)	20 (0.8)	165 (6.5)	13 (0.5) Dia.	11 x 15 (0.4 x 0.6)	43 (1.7)	115 (254)
CHK0650	497 (19.6)	496 (19.5)	244 (9.6)	145 (5.7)	200 (7.9)	400 (15.7)	401 (15.8)	449 (17.7)	206 (8.1)	77 (3.0)	21 (0.8)	40 (1.6)	20 (0.8)	165 (6.5)	13 (0.5) Dia.	11 x 15 (0.4 x 0.6)	45 (1.8)	130 (384)

Figure 46 - 1200 Amp du/dt Filters

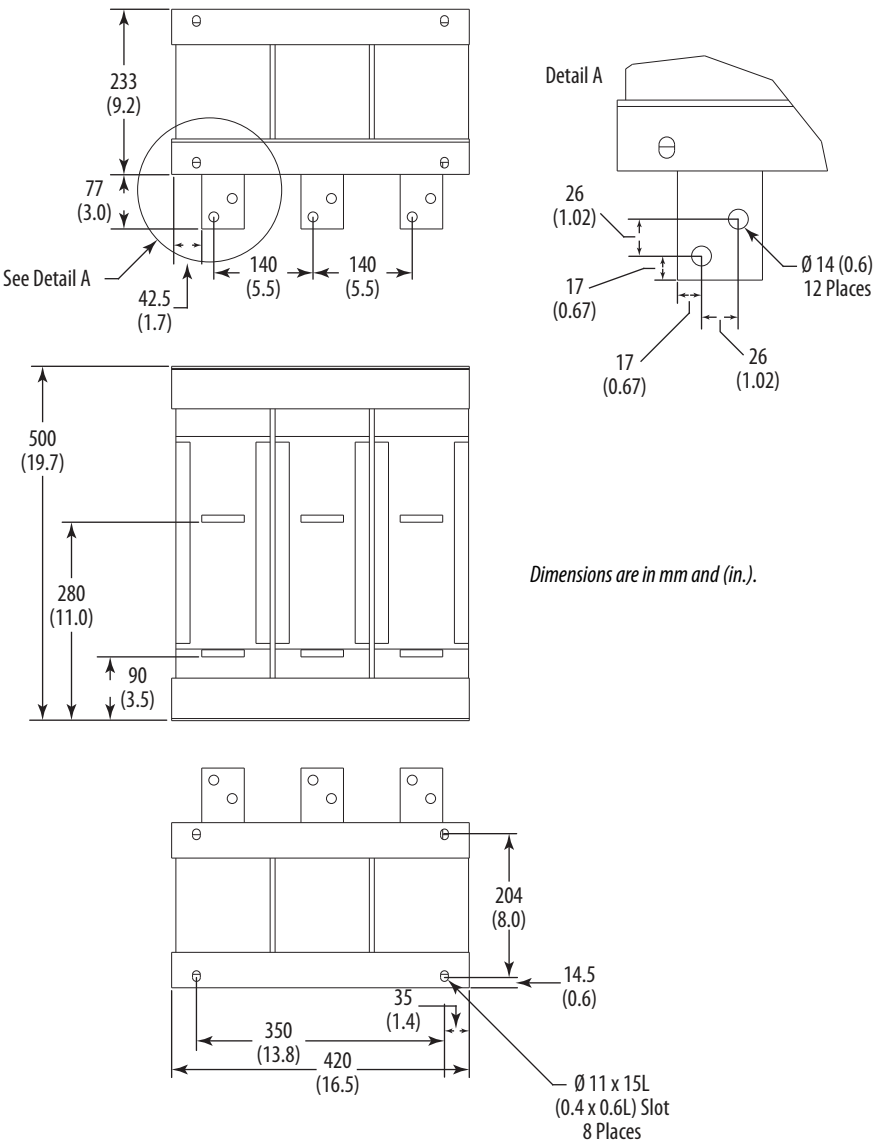
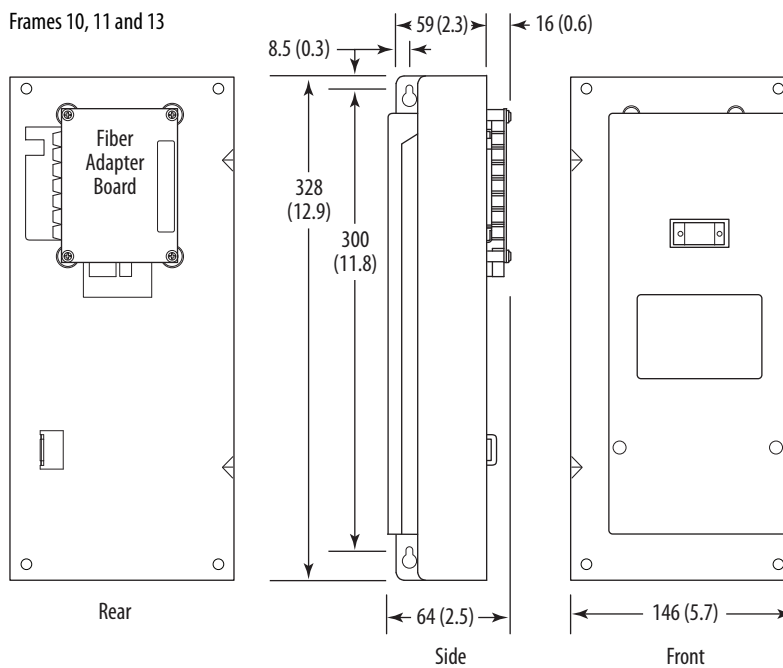
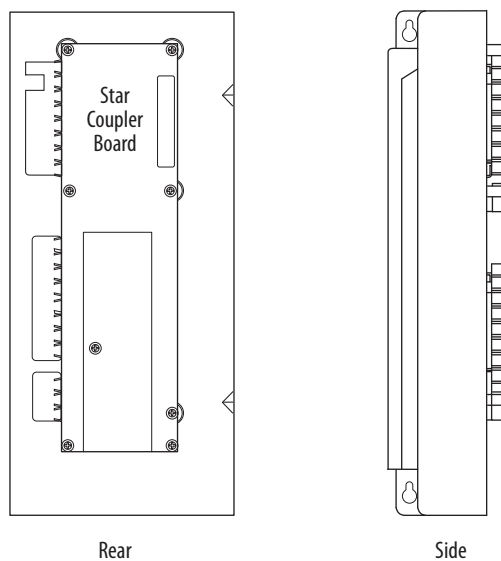


Figure 47 - PowerFlex 700H Control Unit (Removed from Control Frame)

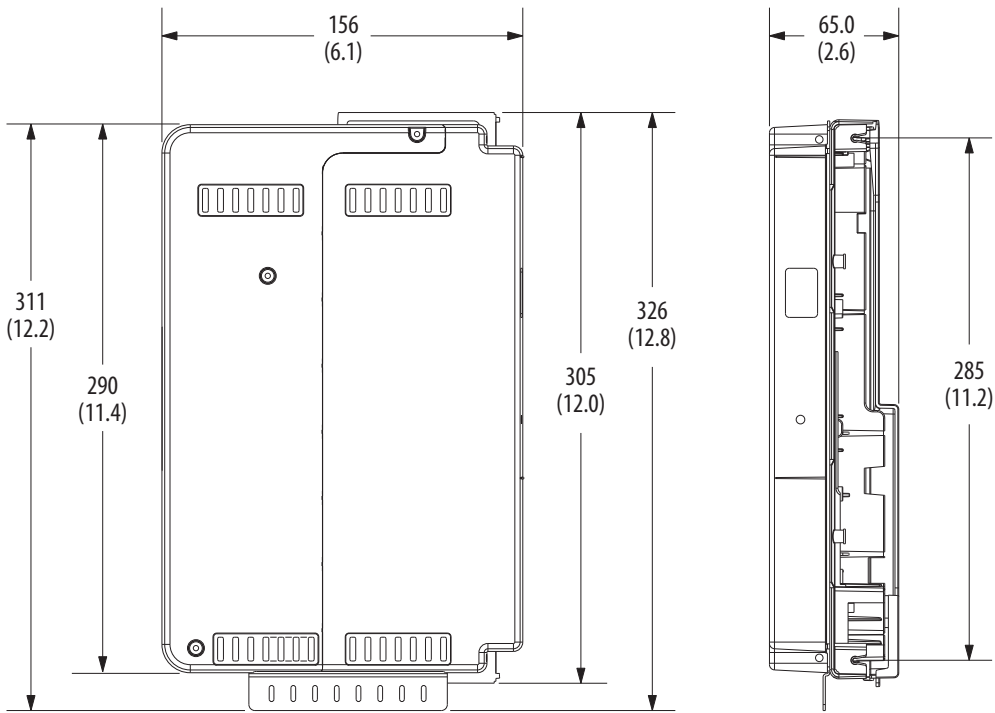


Frames 12 and 14



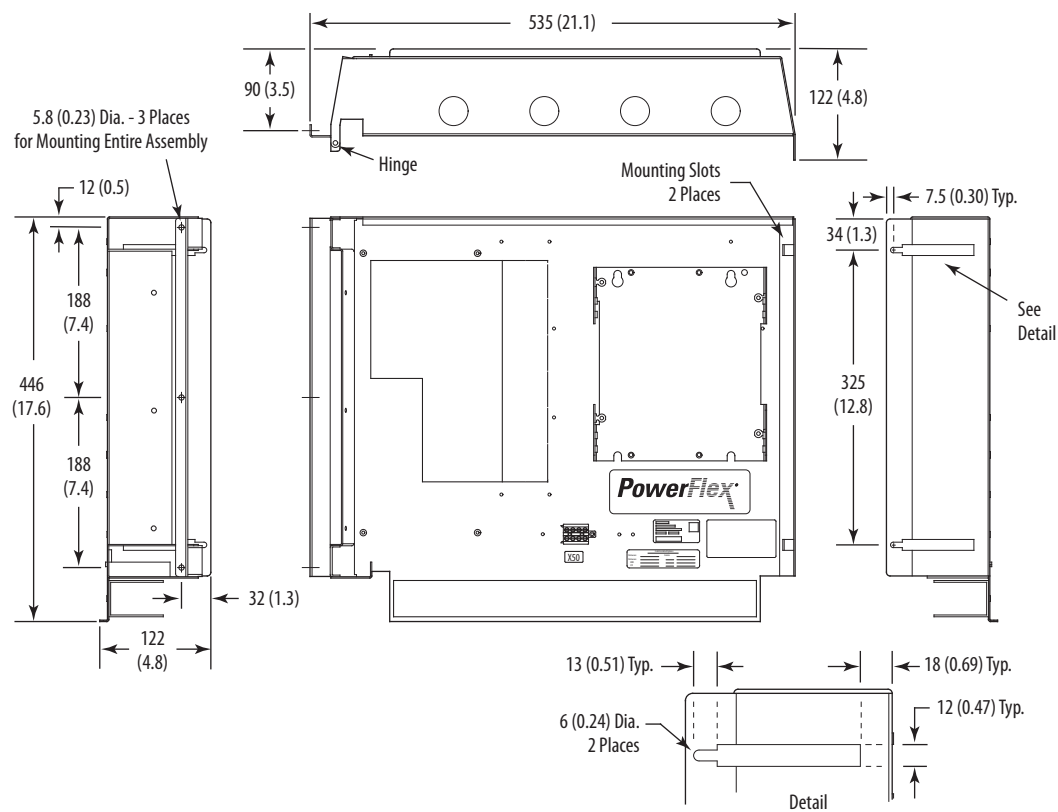
Dimensions are in mm and (in.).

Figure 48 - PowerFlex 700S Control Cassette *(Removed from Control Frame)*



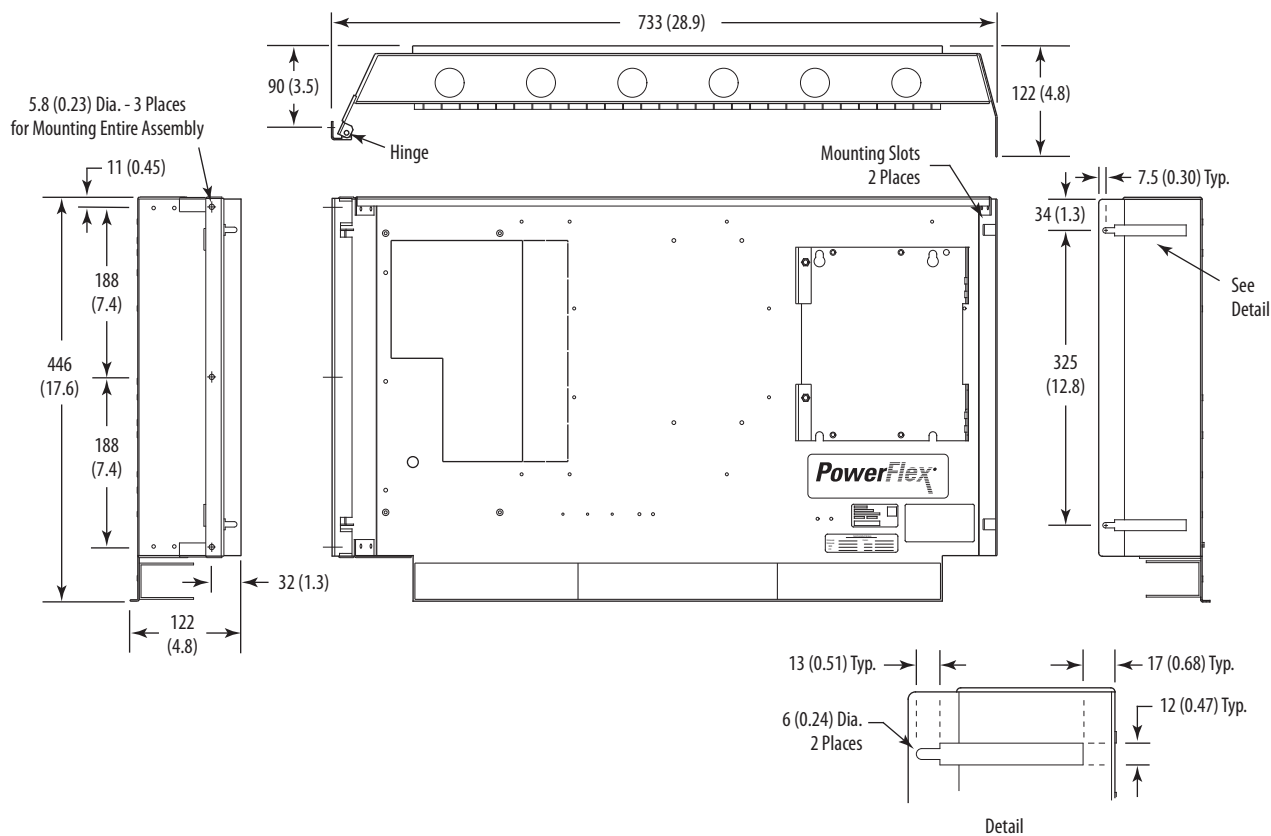
Dimensions are in mm and (in.).

Figure 49 - Control Frame - 535 mm (21.1 in.) Wide



Dimensions are in mm and (in.).

Figure 50 - Control Frame - 733 mm (28.9 in.) Wide



Dimensions are in mm and (in.).

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